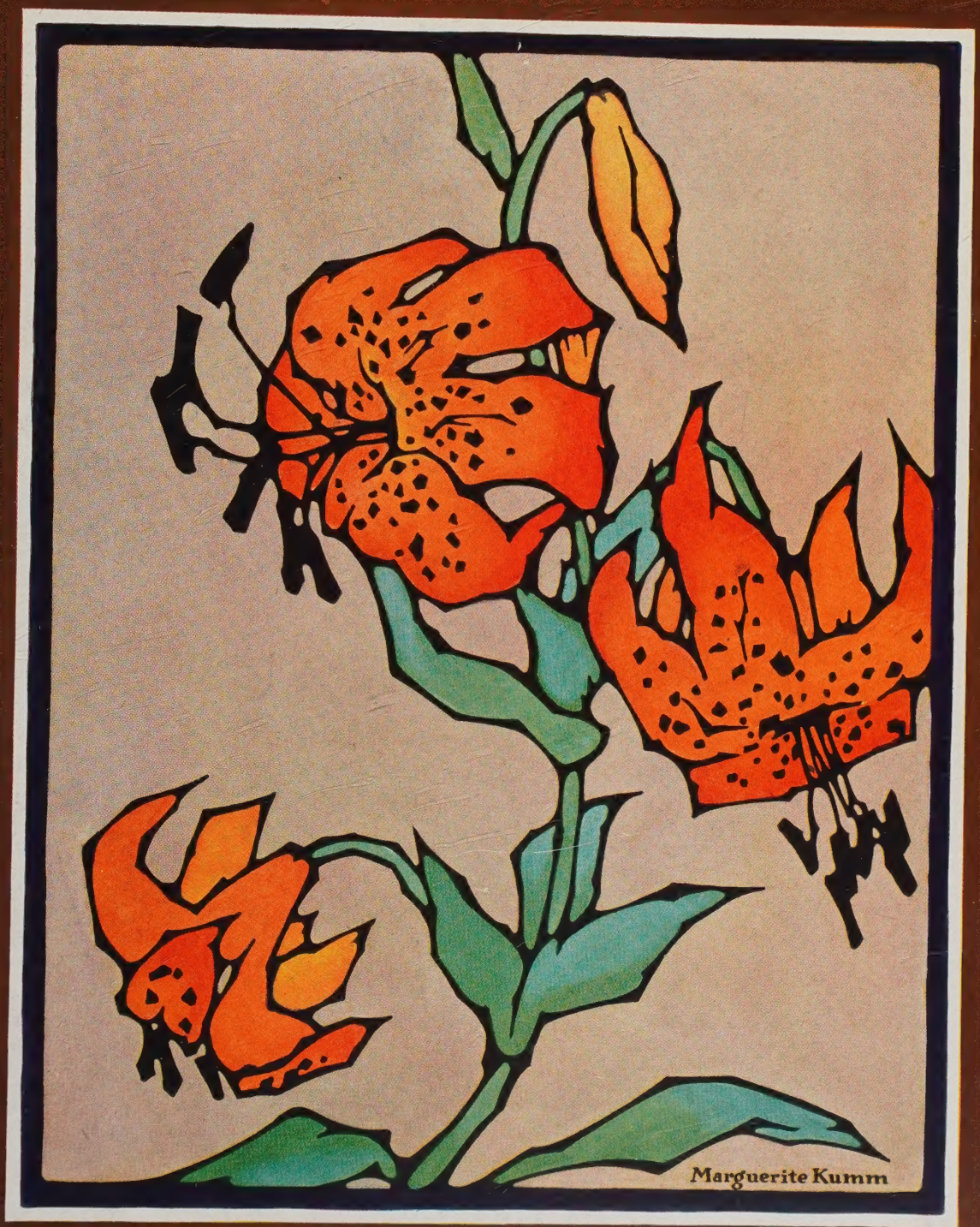
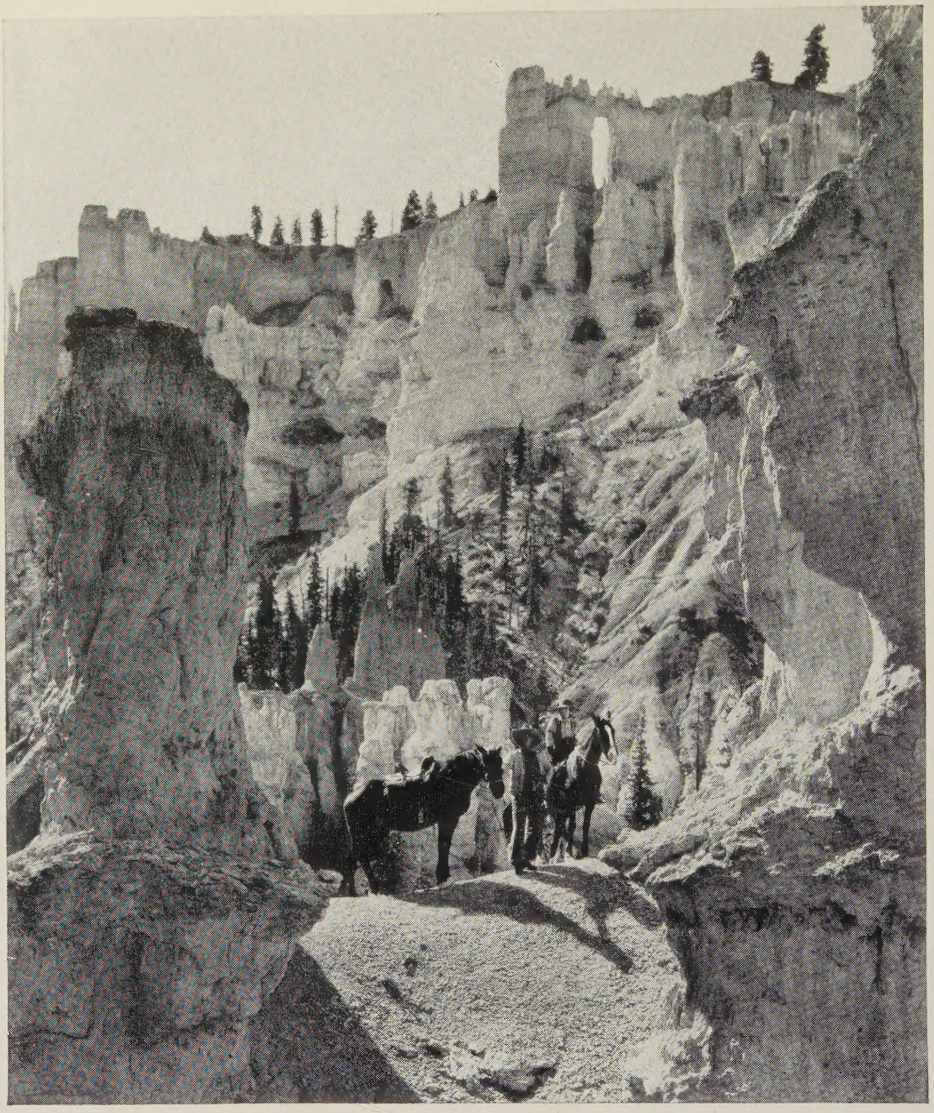
NATURE MAGAZINE



AUGUST 1930 35¢ VOL. 16, NO. 2



THERE IS STILL TIME

to join the American Nature Association Party on its Southwestern Trip. Visit the picturesque Indian Country near Santa Fé. Cross the Grand Canyon from the South Rim to the North Rim. Travel the spectacular Mt. Carmel Highway. Revel in the bizarre beauties of Bryce Canyon and Zion National Parks.

Enjoy all this with a small, personally-conducted group of people actively interested in Nature and the Outdoors. The party leaves Chicago August 23. If desired it can be joined at Lamy, New Mexico, or at the Grand Canyon. All expenses, Chicago to Chicago, for eighteen glorious days, $396.

Last Glacier National Park Party leaves for eight days on the trails of wonderland on August 2. All expenses, Chicago to Chicago, $280.75.

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DIRECTOR OF FIELD TRIPS

American Nature Association, 1214 Sixteenth St., N.W., Washington, D.C.

Edited by
ELEANOR WALKER

A GORGEOUS trip to take in the fall of the year is along the Pyrénées. Lamartine once said that the most beautiful sea view in the world is at Naples and the most beautiful landscape at Pau (in western Pyrénées). Curiously enough, at either end of the Pyrénées lives a race, partly in Spain, and partly in France, neither of which is French nor Spanish. At the western end are the Basques, the oldest existing race of Europe, with a language and customs unrelated to those races about them; at the eastern end are the Catalans, a dark skinned people with black eyes and hair and long, narrow faces. Their country is little known to tourists.

The usual route across the Pyrénées is from the west to the east, starting at Biarritz in the Basque country and going to the Mediterranean. There are two other routes —you may come from Italy or southern France to Perpignan on the Spanish coast and ascend into the Pyrénées; or you may go from Paris to Toulouse (a 450 mile overnight run), just north of the central Pyrénées, meander through Carcassonne to Perpignan and then travel the range west.

Your choice will probably depend on your port of departure for home. One thing is fairly certain. You will not be crowded if you cross the Pyrénées from east to west.

Let us go by rail, donkey and bus starting at La Cité Rose—Toulouse—the pink city, built of brick and roofed with tiles, and architecturally the most important spot in France, after Paris and Rouen. In Toulouse you get the past and the present in juxtaposition, the Sunday morning market set against the famous Romanesque Cathedral of St.-Sernin, the booth market on wheels in the old Place du Capitole, and at the Hotel Assézat, the Académie des Jeux Floraux, the oldest literary society in the world.

Carcassonne, the next stop, is a song in stone. Set on the top of a hill, reinforced with conically topped towers rising one hundred feet, impregnable, beautiful, it makes an unforgettable etching against the sky. It is marvelously eerie seen by moonlight.

(Continued on page 71)

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TWILIGHT

Challenged

IN our May issue appeared a quotation from an article by an eminent nature photographer in which he stressed the importance, in fact, the necessity of using a plate camera. Another expert in photography rises to defend the modern, film-using cameras. He points out that: An inexperienced seeker for proper camera equipment might be led to load himself up with an unnecessarily bulky outfit.

Cut Films are made in panchromatic and super-speed emulsions, are much lighter, easier to handle, take up considerably less space than plates and unlike plates, are unbreakable.

Cameras having the ground glass focusing advantage are now supplied with film holders and also provide for the use of film packs. Reflex types of cameras like the Graflex also permit of using roll film.

Expert No. 2 ends up by saying "No modern camera shop would think of recommending heavy, bulky plate camera outfits for nature work if they knew their business."

There, you have both sides of the case. Frankly, we agreed with the challenger but had this to say in reply to his letter:

"Naturally enough many expert photographers believe that the equipment with which they secure remarkable results is the right one to recommend."

MILKWEED

FLOWERS are indeed fascinating picture subjects. Here, concisely, are a few hints for the novice. To secure large images with the ordinary camera, secure a little supplementary lens known as a portrait attachment. Dewdrops photograph white, and green foliage will not look right if rendered white. It is best to wait until the dew evaporates.

Do not try to picture the flowers if they are being moved vigorously about by a breeze.

A small collapsible tripod is a handy accessory permitting of careful selection and arrangement of flower subjects in the camera finder, and a steady support when "time" exposures are made.

EDITED BY ROBERT T. LOWELL

Curiosity Versus Fear

(How The Deer Picture Was Made)

TO see a small disc of light piercing the blackness so aroused this mule deer's curiosity that he forgot, for the moment, to be afraid. The beam was from a hand flashlight held by a lad in the prow of a canoe, which with muffled paddle was guided through the placid waters.

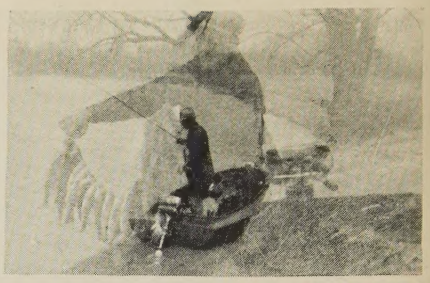
The boy and a companion had set out with Kodak, pocket flashlight and a photographic flashlamp in quest of night pictures of any kind of wild life. With camera set and flashlamp charged they played the pocket light along the shore marshes. We rather imagine it was difficult, when spying the game, to retain enough composure to train the lens on the deer and pull the flashlamp release. The picture, however, is proof positive that it was done before the animal dashed away.

Here indeed is adventure for the camera hunter. We are wondering if fear would have at once overcome curiosity if movie night flares, instead of the pocket flashlight, had been used in an attempt to record the incident with a Cine camera. Maybe some reader knows or will try his luck. We should be glad to hear from him. It is surprising what the ingenious amateur can accomplish with ordinary equipment that is available.

SHASTA DAISIES

Hints on Picturing the Flowers in Field and Garden

Generally, mornings or afternoons are better times than the noon hour when the sun comes from almost directly overhead. Try pointing the camera from various angles to get the most pleasing effect. Include in the picture area but a few of the choicest flowers in a group.



THE PHANTOM PICTURE

"The Fisherman's Dream"

UNINTENTIONAL double exposure does not always produce an interesting picture like the one above. More often it spoils two good "shots".

You know, of course, what we mean by "double exposure"—two pictures taken on one section of film. The two subjects in the Fisherman's Dream picture show a medium distant view of one trying his luck and a close-up of another more fortunate fellow. The pictures happened to be made under light conditions that gave a phantom effect in one of the images.

Generally, we get a great conglomeration of objects when we make a double exposure. There is but one sure way to prevent it. Acquire the habit of *immediately* turning a new section of film into position after you have clicked the shutter *whether* or *not* you intend to snap another right away. If you are not sure of having turned to the next number, bring a new section of film into position anyhow as it is better to lose one space of film than ruin two pictures you may never get again.

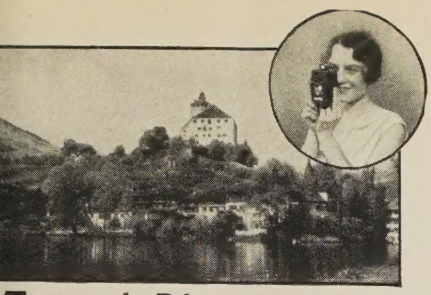
Write The Editor

Limited space makes it necessary to touch only the high spots in things we discuss. Complete details, however, will be given on any subject in which an amateur photographer is interested. Address Editor, Photographic Department.

A Kodak Color Filter will darken the rendering of blue and lighten the rendering of yellow. With this filter the exposure should be increased about seven times. A tripod should be used where exposures slower than 1/25 second are required.

JONQUIL

If using both portrait attachment and color filter, bind the two together but be sure to slip the portrait attachment side over camera lens. Be sure to measure distance accurately, following directions with attachment. Do not stop lens down much when picturing a few or an individual bloom as it is best to have background out of focus; unobtrusive.



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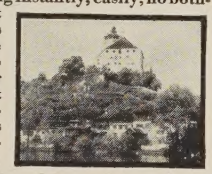

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TRAVEL DEPARTMENT

(Continued from page 69)

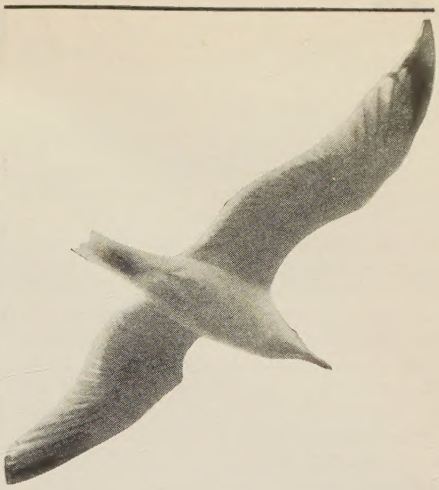
From Carcassonne, the road to Perpignan on the Spanish coast takes you through the Pyrénées Orientales, a country more popularly called Rousillon. The people here, though under French and Spanish rule on either mountain side, are Catalans. From Perpignan we start for the Pyrénées, taking the railway first through Elne, where near the cathedral of Ste.-Eulalie is a very beautiful cloister. We follow the river Tet up into the mountains past villages perched in the most inaccessible places, past towers, hermitages, Châteaux and watering-places. As the railway ascends, here crossing the Séjourne Bridge, there climbing up, there are marvelous vistas down the deep precipitous river valley. After passing Mont-Louis, the highest station on any French railway system, you get off at Font-Romenu to see "the panorama"; and then re-board the train for Bourg-Madame.

Relatively near Bourg-Madame, but actually rather difficult to get to, is the Valleys of Andorra, a mountain republic of six villages with no army, no newspapers, no currency, until recently no postage, and with a capitol building that looks like an old mill. The nation covers only 190 square miles, a sort of Yosemite place, and while independent by the charter of 1659 from Charlemagne's son, is under the dual suzerainity of France and the Prince-Bishop of Urgel—the last example in Europe of the temporal power of the Church. In the fall of the year in Andorra, you may see herds of sheep and goats, a thousand at a time, migrating through the narrow village streets on their way to Spanish plains for winter forage. In the fall, too, you see great festoons of tobacco hanging from the windows to dry, for sheep grazing and tobacco raising are the chief industries. It is amusing that the archives containing their treaty should be barred with six locks, the keys to which are scattered among the six villages when one or two blows of a strong fist could knock out the whole front of the box. The hospitable Andorran will probably offer you wine from a *porro*, a glass dish round like a bowl, closed over the top, with a short hollow handle on one side through which the wine is poured and a long delicate tapering stem on the opposite side from which the wine is sort of inhaled in a phenomenal arc which jets down the throat—a true loving cup. Andorra may be hard to get to—you can take a bus to Puigcerda, then another bus to Seo de Urgel, and another bus to Andorra Villa, the capital village.

At Bourg-Madame, to which we return from Andorra, we start on La Route des Pyrénées, in a long zigzag over the mountains. Sometimes you look down over a dizzy precipice into valleys far below. We go through Foix, (a town from which to explore ruins) and from Foix past old châteaux to Pau, where we get out to see one of the most gorgeous panoramic views of the Pyrénées,—hills, and hills climbing up into the mighty range of jagged gray and white and purple mountains.

The ride from Pau through Eaux Boumes and Eaux Chaudes, both charming villages set down deep in gorges, to Cauterets, the highest of all French watering places, shows

(Continued on page 73)



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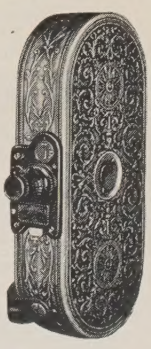

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NATURE IN PRINT

Know Your Trees

A revised edition of *What Tree is That?* by E. G. Cheyney, Professor of Forestry, University of Minnesota, has just appeared from D. Appleton and Company, New York. The very fact of a new edition proves the book's popularity, and the interest of readers in knowing their trees. A very simple, effective style has been followed throughout: on the right hand page appears a brief description of each family of trees and its chief characteristics, while on the left is pictured in outline the characteristic leaf, fruit or other identifying feature. The book is very handy in the woods, as it includes all the common trees of the United States. It is priced at $2.

Three Nature Books

When we were very young, we read such highly important material, in the primary grades, as "I see the dog. Do you see the dog? We see the dog." Without being disloyal to our past, it is easy to say that a new primer entitled *Moths and Butterflies*, just from the F. A. Owen Publishing Company Press, at Danville, N. Y. is much more interesting. In short, clear sentences it combines the essentials of a first reader with the essential facts about moths and butterflies, with the result that a reading lesson becomes a Nature lesson as well. This book, with list price of $.72, has been prepared by Lina M. Johns and May Averill, and illustrated by Mabel Betsy Hill. Another Owen publication recently out is *Prove It Yourself*, consisting of a series of interesting experiments in light, heat, sounds, distillation, and other natural phenomena. Since the author, Bertha F. Gordon, has so arranged her experiments that no elaborate equipment is needed, the book is as useful at home as in the school. It is listed at $1.50. A third Owen book of the month is *Nuts and Citrus Fruits*, a geographical reader dealing with the history and commercial utilization of both types of plant offspring. Francis C. Owen and Ellen M. Ramsay are the authors. The book is priced at $.72.

Hills and the Sea

One cannot say of Hilaire Belloc's book, *Hills and the Sea*, recently republished by E. P. Dutton and Co., merely that it is a great book, or that any person who is going to travel over the Continent and England must read it. It cannot be classified or pigeonholed. Its whimsical humor, its satiric touch, its quaint descriptions make it a Mark Twain sort of work, yet much more gentle, less broad and barbed than *Life on the Mississippi* or *Roughing It*. It catches the English spirit and atmosphere and analyzes it; it looks at Europe through the eyes of a clever Englishman. It rambles as did its author collecting material for it, and offers dissertations on all subjects in view of the hills and the sea. This book is not to be dashed through hurriedly, but demands reflection, if its high lights are to be caught in proper focus. The new edition is sumptuously illustrated with color plates by Donald Maxwell, and is indeed worth the $5.00 at which it is priced.

Aquatic Animals

To one who has watched the sinuous otter loping along the shore of his pond, and then slipping into the water where he submerges and glides about as readily as does the fish, it is not difficult to realize that here is a land animal that has taken on aquatic habits. And if one has come suddenly upon a great gray fur-seal ashore, even with the knowledge that here is a creature scarcely less aquatic than the fishes themselves, the resemblance to the mountain-roaming bear is startling and significant. Still many will be surprised to learn that the porpoise and whale, creatures that only a few hundred years ago were considered even by naturalists as fishes, have also descended from land mammals.

These are examples of mammals with more than ordinary aquatic ability. Then there are some that are slightly less well adapted to life in the water, as the beaver and the muskrat, and many groups, especially among the smaller rodents and insectivores, that range from mountain top to marsh, but in which some species have developed a skill in the water scarcely surpassed by those that derive from it their principal sustenance.

How and why these abilities have been acquired are discussed at length in the pages of *Aquatic Mammals, Their Adaptations to Life in the Water*, by A. Brazier Howell, and published by Charles C. Thomas of Springfield, Illinois. The mechanics of swimming, the special senses from the point of view of modification, the various parts of the animal that have been changed, are all ably and interestingly discussed in the twenty-two chapters. In treating these features recourse is frequently made to analogy, and the discussions of the characters of other classes of animals bring out in a striking manner the wide knowledge of the author, and the pains he has taken to bring to bear every possible point in anatomy, and in the habits that concern aquatic adaptations. We note that the book is dedicated to those who are endeavoring to save from extinction the whales, the largest animals that have ever lived. Those who deplore the passing at the hand of man of many of our most interesting and beautiful species will be dismayed to learn that the author has been unable to learn how the sea-otter uses his hind limbs in swimming. Those who have helped to bring this creature so near to the point of extinction have not taken the trouble to tell the rest of us how he swims. And the ruthless destruction that is causing the passing of so many of our beautiful forms of life is continually furnishing fresh examples of this kind.

Aquatic Mammals is one of the notable books of the year, and one that will not soon be displaced. It costs $5.00. E. A. P.

Astronomy Text

A complete textbook on astronomy has just come from the press of D. Van Nostrand and Company, Inc. It is prepared by Robert H. Baker, Professor of Astronomy in the University of Illinois. Although somewhat technical in treatment, the lay reader may obtain considerable information from a perusal of it. It is priced at $3.75.

Plant Life Dramatized

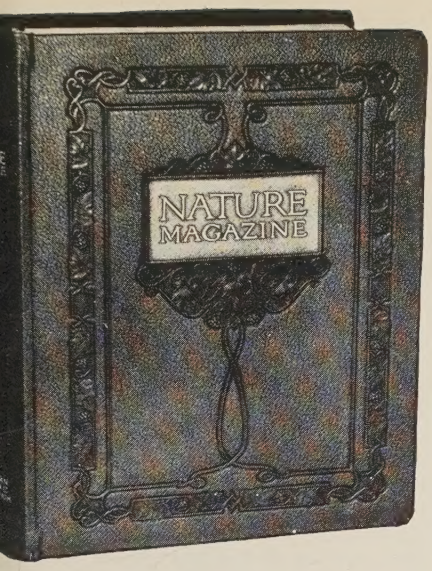
When we "took" botany, back in the collegiate days, we were so impressed by the collection of Latin terminology and style-less scientific phraseology that we yawned and went to sleep. It took a visiting lecturer, who marshalled his facts into a dramatic story sprinkled with humanistic word pictures, to wake us up. Recently another such botanical impression was made upon us when *Green Magic*, by Julie Closson Kenly, came to us from Appleton. Here was accurate information on plants—their seeds, leaves, stamens, pistils, roots, stems—but there was something else. Her words were alive, her figures and similes were taken from the everyday world to create lasting impressions. Her style was lively without being slangy, and clever without forcing. Clarity and simplicity characterized the writing. Besides, Miss Kenly has left the impression, from this book, that plants are not static things, like minerals, but individuals, somewhat resembling humans in certain respects and, with reactions to the world different only in kind from those of animals. One feels a fellowship with the cat-tail in the swamp or the skunk cabbage of the moist woods after reading *Green Magic*. It is published in two editions, one designed for school use, the other for the library table. Both are illustrated by very fine and accurate woodcuts by Edna Reindel. The home edition is priced at $2.50.

Hudson River Nature

Along the shores of the Hudson River, near Bear Mountain, animals of all sorts play. Birds flash through the woodlands; they wade the shores of beaver ponds; they nest in the meadows. Skunks, beavers, deer, weasels, and a host of other mammals reënact, day after day, that drama of Nature which never stops, though curiously enough it plays more vigorously to an empty house than to a full one. William H. Carr, assistant Curator of Education in the American Museum, in charge of the outdoor museum and Nature trails at Bear Mountain, has recently written a delightful book about this region, under the title of *The Stir of Nature*. He relates his own experiences—with tracks, with beavers, herons, mice and other birds and animals—but he so enthusiastically portrays his adventures that he creates a longing in the reader to share similar ones. And the information is there, accurate, clear and precise, easily making the volume, priced at $2.50 by its publishers, The Oxford University Press, worth much more than that amount.

Fingerfins

"Fingerfins" was a Sargasso fish, of which thousands live out their unique existences mid the Gulf weed of the Sargasso sea, but because he was picked up, studied and painted by Wilfrid S. Bronson, member of a scientific expedition to the Sargasso sea, his fame may endure. The queer life of this fish and his companions of the Gulf Stream is very attractively portrayed in *Fingerfins*, published by Macmillan, and written and illustrated by Mr. Bronson. The drawings are unusual, and the accompanying story is well told and accurate. It is priced at $2.



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TRAVEL DEPARTMENT

(Continued from page 71)

the most gorgeous and breath-taking scenery of the whole trip. You stop at Cauterets, and from there visit the cirques "the most unique and distinctive natural wonders of the Pyrénées—vast circles of high deserted precipices let down into the pockets of peaks" down the walls of which cascades tumble in glorious confusion, falling sometimes over a thousand feet. There are several cirques that may be visited about Cauterets, but the most beautiful is the Cirque de Gavarnie—a great amphitheatre two and a quarter miles wide at the bottom, surrounded by limestone mountains with snow and glaciers beyond. Hugo and Taine have written of it and of the glory of the cascades coming over the precipices.

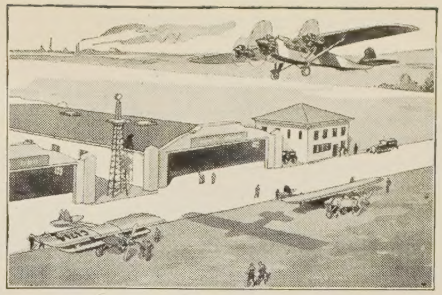
And so we spin along, from Cauterets to Luz, and Luz to Luchon, whence we may ascend the Pic du Midi de Bigorre, and at Luchon we take a cog railroad to Super-Bagnères, to get a mountain and valley view that is as beautiful almost as that at Pau. If you wish to pause to feel human compassion, stop at Lourdes, that shrine city to which every year over one million sick come to gain miraculous health at the "Grotto of our Lady of Lourdes." From Lourdes we will go into Basque country, preferably leaving baggage at Bayonne, and making tours out from there.

Voltaire says, "The Basques are a little people who jump and dance on the tops of the Pyrénées." Agility seems to be the keynote of the Basque character, agility in the dance, for which they have a passion, agility in smuggling, and agility at pelote, the great and ever present national game, played on a court and against a wall, and about ten times as strenuous as our tennis. The Basques are the oldest race in Europe today—a stoutly built people of middle height with long aquiline noses—very honest and religious, but despite their agility, not very enterprising. The coast Basques are sailors and fishermen—the inland Basques agricultural folk. There are seven provinces, three French and four Spanish, the French united into the department of the Basque Pyrénées, the Spanish still more or less independent units, administering their own laws. The Midi railway has bus and rail excursions which go through both the French and the Spanish Basque country with the option of stopping off wherever and whenever you please.

Bayonne itself is not typically Basque, but there are two museums you will find worthwhile—the Musée Basque, containing a complete collection of Basque furniture, tools, costumes, cooking utensils and weapons and the Musée de Bayonne, left to the city by Léon Bonnat, with not only much of his own work, but also an invaluable collection of the preliminary working sketches and studies of such masters as Michael Angelo, Raphael, Rembrandt, Durer, Rubens, Ingres, etc.

Biarritz, just next door to Bayonne, is a strange anomaly in this country—one of the world's leading fashion and gambling resorts. It's a lovely stretch of coast at Biarritz, but don't consider the town Basque at all, even though it is in the Basque country.

(Continued on page 74)



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An Indian Speaks

Out of the garbled and censored press reports coming from troubled India, one cannot construct a coherent picture of one of the most colorful countries of the world. To the liberal, opposed to empire-building, Indians are holy martyrs; to the average Britisher, they are ungrateful wretches refusing the alleged blessings of Occidentalism. No Westerner, steeped in a culture that branched from the ancient culture hundreds of years ago, can catch the Indian point of view, and see the glories and beauties of the Eastern country as the native sees them. For these reasons, *Visit India with Me,* by Dhan Gopal Mukerji, who wrote *A Son of Mother India Answers,* after Katherine Mayo's six month visit had produced *Mother India,* is a book that every intelligent person anxious to get both sides of an important problem should read. It is written as a travelogue, in which the author acts as guide for an American visitor, and goes deeply not only into the physical aspects of the country, but into the religious, social, psychological and emotional phases of Eastern life. It is excellently written—at times the prose becomes almost lyric in quality. For one contemplating a visit to India it is almost a necessity. It is published by E. P. Dutton and Co. for $3.50.

Dish Gardening

The East has given the West many delightful things, but none more charming than the wonderful dish gardens that are wont to decorate Japanese homes. Little "Gardens of Eden", with Eves and serpents and all; little groves, desert islands, mountain scenes, all contained within the measure of a dish—these are exquisite creations the idea for which arose in the Orient and has been transferred to our shores. In his book, *Adventures in Dish Gardening,* published by A. T. De La Mare Co., Inc., Patten Beard has collected a host of information on this indoor sport and so attractively illustrated it that one look will make a convert. Mr. Beard says that dish gardening is not much work, requires few materials, and has more appeal to the creative interest than gardening on a larger scale. He gives full directions, and many initial ideas for amateurs. The book is priced at $2.50.

Plant Exploring

David Fairchild, in the introduction to his recently Macmillan-published book, *Exploring For Plants,* says that he will be content "if a perusal of its pages shall convert a single person to the romantic life a deep study of plants can give." He should be due for lasting happiness, for no work of recent times has so thoroughly brought out the thrill that comes with plant investigation, either at home or abroad. Mr. Fairchild carries the reader over the islands of East Indies, Sumatra, Java, Ceylon, Morocco, Algeria and the west Coast of Africa. He broils him under a tropic sun and freezes him on the mountain tops. He finds for the student wonderful and little known forms, for the epicure strange exotic dishes, for the adventuresome jungle experiences not without their thrill, for the anthropological-minded unusual peoples. The story is written in chronological fashion, with no attempt to be spectacular, and is full of interesting details. For the lay reader it is a tale of adventure; for the scientific, a record of important and interesting discoveries. It is priced at $5.00.

The Big Trees

To stand before a giant sequoia is to recall an old and beautiful verse: "When I consider the works of Thy fingers, O God, what is man that Thou art mindful of him?" And if the history of the Big trees could be completely told, the feeling of reverence would immeasurably deepen. Their story, such of it as has come within the ken of man, is well told by two men who love them in a book recently issued by the Stanford University Press—*Big Trees.* The authors are Walter Fry, U. S. Commissioner of Sequoia National Park, and John R. White, the superintendent. They treat the discovery of the redwood and sequoia giants, the vigorous struggle to save them, the scientific revelations derived from a study of their rings, and their life requirements and habits. Many personal anecdotes of individuals and trees are sprinkled through the volume, giving it a rich flavor. The book is more than a guidebook to the sequoias; it is as complete a history as has yet been written of a type of plant life that cannot be viewed without leaving an impression of majesty and beauty.

The Personality of Trees

Ever since the days of beliefs in the Druids, men have endued trees with personality—the birch with graceful, feminine charm, the oak with stalwart, masculine vigor and strength. In *The Charm of Trees,* published by Fleming H. Revell Company, Thomas F. Davies has once more sought to catch the spirit of the trees, and in prose rich in poetical allusion and quotation has voiced the thoughts the majority of us have had but dimly. This little work, priced at $1.50, is most pleasant reading, and will furnish many enjoyable hours.

Helpful Pamphlets

During the past month, three factual, valuable publications have appeared, each of which is distributed free of charge. The New York State College of Forestry at Syracuse, N. Y. has brought out its second edition of *The Development of the Vegetation of New York State.* The Department of Agriculture is responsible for the other two pamphlets, one entitled *Porcupine Control in the Western States,* and listed as leaflet No. 60, the other labelled *The Production of Hyacinth Bulbs,* and issued as circular No. 112.

TRAVEL DEPARTMENT

(Continued from page 73)

To see real Basque life, you must follow the little rivers Bidassoa, Nive, etc. inland up into the hills and mountains, or you must follow the coast west from Bayonne through the fishing villages where you'd see brown sailors with gold rings in their ears, odd fishing craft, and lovely stretches of yellow sand. There are several lovely motor trips through the country, such as the one from Biarritz to Bilboa, mostly along the sea, from Tolosa to Pampeluna through wild and beautiful inland, and from Vitoria to Onate, thence to the lovely mountain sanctuary of Nuestra Señora de Aranzazu. From this monastery you get one of the best mountain views in the Basque country. Then there are the twin cities, Azcoitia and Azpeitia, between which lies the monastery of Loyola built on the site of Loyola's birthplace.

The Basque men wear blue berets, a wool or silk scarf around the waist, either red or violet, short jackets, white collarless shirts and rope sandals, and often carry a cane, the makhila, with a screw top out of which comes an iron point. They are a fierce people—in the olden days the pope used to absolve the bishop from his visits through their country because of brigands and thieves. The Basque women wear mostly black, and are given a great deal of recognition. Processions and masquerades are frequent among these people.

If you ever feel in the mood just to sit and not to think, Mallorca is the place to do it—a serene, beautiful spot where neither men nor Nature notes time in its passage. It's so accessible from Barcelona, yet enough off the beaten path to make it more or less tourist free.

Mallorca is now under Spanish rule; its best families are descendants of Spanish grandees; and its language is supposedly Spanish. But there are marked traces of the 800 year Moorish rule—in mosaic-tiled floors, in olive orchards planted so long ago, in the Oriental eyes of Mallorcan faces, and particularly in the Arab music of the peasants. The life the Spanish live is very uneventful with little activity outside of the family, and all that within closely shuttered walls. The Mallorcans love their domestic animals so much that they cannot admit killing. Signs appear over butcher shops, "Turkeys will kill themselves here in two days."

The boat will land you at Palma, the capital of the island, and aside from the interest of its people, its old palaces, and its scenery, there are two notable buildings there, the Lonja, or exchange, and the cathedral, which Ralph Adams Cram, our noted American architect, says is one of the world's four finest cathedrals.

One of the most charming ways to see Mallorca is to get a boat and a pilot and skirt the shore. The character of the coast varies from rocky caves to sandy beaches, and on the eastern end of the island are caves far more beautiful than those of Cuba or Bermuda, the caves near the village of Arta, and the caves of Dracho near the Bay of El Christo. You will want to put in to shore at Pollensa Harbor and watch the ever changing beauty and color of the bay. Travellers of long experience linger at Pollensa.

There are inland tours you should like, particularly Soller, and when you are through and ready to embark, make short trips to the other two Balearic Isles, Minorca and Ibiza.

If you have more time to spend in Europe in the fall than the Pyrénées and Balearic Isles will take, why not go to the Italian lakes, so especially beautiful in autumn. At Stresa on Lake Maggiore the royal family of Italy live during September, and they must have selected that spot at that time because it is so lovely.

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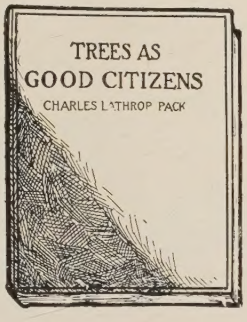

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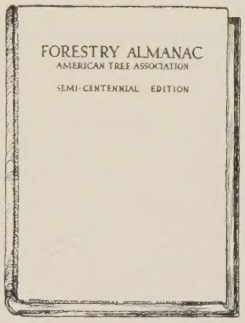

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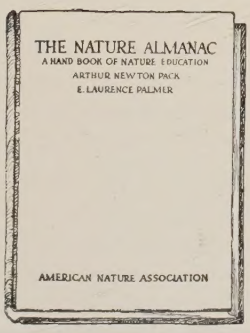

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The FARMER AND THE SPORTSMAN

An Editorial

SOME years ago the Supreme Court of the United States declared: "The wild game within a state belongs to the people in their collective sovereign capacity. It is not the subject of private ownership except in so far as the people may elect to make it so. . . ." This important ruling has encouraged the State in its praiseworthy work of protecting our wild life by demanding license fees—prescribing daily and seasonal bag limits, outlawing certain methods of taking game, and in other ways. But latterly a new element in the relation between the game and its harvester, the hunter, has come to the fore. This is the man on whose land the game lives, the one who raises it. He may be either farmer, rancher, dairyman, orchardist, timber owner, forester, country-home owner, or just any person who has acquired ownership or control of a tract of land that has wild life, be it game, fish or small birds, that he wishes perpetuated. It may be also plant life that is cherished. Let us refer to the land owner as the farmer, and to the hunter as the sportsman. Their relations are coming to be much discussed by both sides.

In the old days, when game was plentiful and hunters were few, the relation between the farmer and the sportsman was usually pleasant. The sportsman was often a neighbor, or at least one known to the farmer, and even if a market-hunter usually respected the farmer's rights. There was relatively little friction between landowner and hunter.

Lately, however, have come many changes. The game has dwindled; its haunts have grown less; the hunters have increased. The State, by every means in its power, seeks to sell as many licenses as possible to increase its revenue. In most cases the number of these licenses bears no relation to the stock of game. When any species seems to be endangered, its season, or the bag limit, or both, are reduced, or its capture is forbidden altogether. This places a heavier burden on other species. But the State cheerfully continues to sell hunting licenses in unlimited numbers, the while urging the killing of enemies of the game, planting game taken from other places, or raising and liberating foreign species. The inevitable was bound to happen, and it has happened. The army of sportsmen is increasingly out of all proportions to the game. So the race to decide who shall get some of it is on. Each one strives to get his share, and in some of our States the sportsman's share turns out to be a fraction of one bird each year.

The fish are in the same situation as the game. Both are on the farmer's land, for public hunting grounds and fishing grounds are largely a myth, as the sportsmen themselves admit.

In addition, the average sportsman knows little of the true situation. He is today more likely to be the large city or town man who conceives of the farmer as an individual who is a farmer because he doesn't know any better. He is taught by the State that it owns the game, and he considers that the State has sold him a share of it. Being sure of these points, but knowing little else about the matter, he goes after his share. He knows how a deer looks on a magazine cover, but he hasn't any idea of how it looks in a thicket. The differences between a pheasant and a chicken, if the birds be only dimly visible, are unknown. He is hazy as to the courtesies due the landowner and his family. In short, he "fails to arrive", in the matter of his obligations. And the farmer has begun to take notice of the situation. Also the changed condition of affairs is dawning on the sportsman, and he is making frantic efforts to convince the farmer that he is mistaken. And the sportsman is being seconded in these efforts by the makers of ammunition, for it takes a cartridge—in fact, several of them—to bag each head of game.

We know of a man who a few years ago acquired a small tract of wild land with some rabbits and squirrels, and an occasional brood of bobwhite or woodcock. He wished these things to live. There were also many flowering plants and shrubs. He did not wish to exclude the public because a trail led through his land to the river, so he put up signs, not of the usual prohibitive sort, but permissive, asking only that the property be not damaged. He has been disillusioned. His shrubs and ferns and flowers have been ravaged and carried away by the truckload. His birds and squirrels have been killed. The small cabin he built has been repeatedly broken into. The latest occasion was the work of a hunter, for the lock was broken by two charges of shot. It is yearly less difficult for this owner to gain the viewpoint of the farmer, and sometimes he wishes that he had a high, pig-tight and bull-proof fence around his property with three strands of barbed wire at the top.

What is the answer to all of this? We do not know, but we are watching the play, hoping that there will be some of the wild life left when we are old. And we believe that the farmer is helping.

Above we have a booby on a typical nest on a low shrub at "Beebe Cove," Darwin Bay, Tower Island in the Galapagos. Below are the somewhat bewildered makings of a swallow-tailed gull

Nine feet is the wing spread of the waved albatross on its nest above, while below we have the results of age in the fashioning of a svelte and watchful swallow-tailed gull, a numerous inhabitant

The good ship "Mary Pinchot" on which the party sailed the southern seas and saw many things one hesitates almost to believe

NATURE MAGAZINE
VOLUME 16 AUGUST · 1930 NUMBER 2

BIRD TALES YOU MAY NOT BELIEVE

BY HOWARD H. CLEAVES

PHOTOGRAPHS BY THE AUTHOR

WE OF the Pinchot South Sea Expedition were destined from the beginning to have the oddest adventures with living creatures, especially birds. Should you decline to believe the things I am here setting down it will be all right with me. Were these same tales to come from the lips of my best friend I think I would want him placed under oath, and then I might keep my fingers crossed.

On Easter Sunday we sailed from New York in the three-masted, auxiliary schooner *Mary Pinchot* and headed down the coast as the bird migrants were coming up. It was the season when bird club members stand up in meeting, field notes in hand, and enthusiastically report the latest arrivals, while fellow members sit impatiently waiting to do the same.

April first the weather was what a seaman calls *dirty*. This weather affected the migrant birds, too, even though they had not eaten corned beef and cabbage as we had done. Thousands of them must have drifted out over the ocean. Doubtless large numbers became distressed and it is safe to say that many perished. We saw two of them die and a third escape by miracle. To these birds our little ship must have seemed an oasis in a desert of treacherous water. They descended upon us in force. Here was a state of things the like of which I had read about, but which I had never before witnessed.

A fish hawk tried first our bowsprit, then the rigging, then departed. With his five and a half feet of strong wing he found himself better off than some others. A flicker tried to clamp himself to one of our masts but his toe nails weren't sharp enough. Never had he seen trees so slippery. A robin stayed with us for a short time only; we had no worms. Two dainty mourning doves were likewise among our transient guests. One got away safely but the other evidently was too tired. After starting off over the waves she tried to return to the ship but just missed the rail. One bump of the delicate breast against the ship's side and the bird fell to the water and doubtless drowned.

Never would I have supposed I could feel sympathy for a cowbird, but circumstances alter emotions. Two females of the species were among our visitors the morning of April second. One escaped but the other was attacked by herring gulls, forced to the surface of the ocean and devoured. That cowbird died in dramatic circumstances far from "the green pastures."

Guests that remained longest were vesper and Savannah sparrows. They stayed with us for hours, exploring among pulley blocks and coils of rope on deck—substitutes for grass and stubble. These birds were a long, long way from New England hillsides. We must have carried them seventy-five miles southward when they wanted to go north. By mid-afternoon all except one vesper sparrow had struck out for better or worse. This last sprite tried many times but failed. Speculating about him became a sort of sport with us.

"There he goes," somebody would sing out, "he'll make it this time."

But at fifty yards he would turn about and come back to us. Once we thought him a gone vesper. He went thirty or forty yards, then

Howard Cleaves is undoubtedly known to many readers for his bird lectures and his notable work in wild life photography. His most recent field activity was as the photographer-naturalist of the Gifford Pinchot South Sea Expedition. In the accompanying story Mr. Cleaves introduces us to some interesting true tales of bird life in these southern lands. Mr. Pinchot has told the story of the trip in his book, "To the South Seas," which is illustrated by Mr. Cleaves' pictures taken on the expedition.

weakened and dropped into the ocean. A groan of sympathy came from several throats. This tiny waif was our deck mate. We and he had been on intimate terms for hours. Once he had taken a siesta directly beneath Mr. Pinchot's chair on the after deck, doubtless the only vesper sparrow ever to go to sleep between the brogans of a governor. No ordinary vesper sparrow, this. Yet there he was bobbing on the vast ocean, a hopeless little speck receding rapidly in the wake of the ship. At any moment a gull or big fish might gobble him.

As I watched through my glasses the miraculous happened. The sparrow, appearing limp, possibly dead, was raised on a big wave—one of those seventh swells. Then a strong puff of wind came racing up the far slope and lifted the frail little body, like a bit of foam, from the crest into the air. The bird took instant advantage. Fairly vibrating his wings, he started beating his way back toward us.

VESPER SPARROW

When he made the rail all cheered

"Come on little fellow," I shouted.

"Go it," encouraged the Governor.

When Vesp finally made the rail our whole company cheered as if Babe Ruth had hit a homer. We wanted to cuddle and warm him. He looked so miserable, his plumage soaked and wings held weakly away from his sides. But he knew how to take care of himself. Down among the aft seat cushions he went, out of the wind but in the sun, and there remained quiet for a long time. Then he reached for the little oil sac at the base of his tail and began preening his feathers. "Stiff", a fourteen-year-old boy who was on the cruise, fetched drinking water. Pete the cook sent up oatmeal. These were offered to Vesp by Dr. A. K. Fisher, ornithologist of the expedition, who for years has fed small birds on an island sanctuary in the Potomac River.

Our patient began to perk up. The Scotch know what's nourishing. The oatmeal was doing its work. Before the end of the afternoon Vesp took off again. This time his flight was strong. The yellow dunes of the North Carolina coast showed plainly ten or twelve miles to the west. Toward them the sparrow steered his course and we feel sure he made the goal.

AN IMMATURE GALAPAGOS HAWK

Thanks to the members of the party he had a big lizard meal

In the Caribbean two weary barn swallows took rest on the ship, twittering and fluttering as if in a farm yard. Stiff was able to take one of them in his hand. He offered it water in a bowl but without success. Hundreds of miles of ocean flying with no insect food and without a drink had proved too much. We found it dead on deck next morning.

Also in the Caribbean our expedition visited islands off the beaten path, among them the Swan Islands. As we neared the larger of the two we were followed by numbers of brown boobies—tropical gannets. At the time G. P. (Gifford Pinchot) was trolling from the schooner. To our amazement the boobies began plunging from the air into the water, mistaking the silver spoon for a fish. As each of these large and powerful birds hit the spinner

DRYING OUT IN A SUNNY HAVEN

Perhaps the only vesper sparrow to sleep between a governor's brogans

AND HERE THE ORIGINAL BOOB

One of the brown boobies of Little Swan Island in the Caribbean

a heavy jerk, like the strike of a fish, could be felt on the line. It seemed a wonder to us that none ever was hooked.

At Cocos Island in the Pacific we were literally deluged by boobies. It was a booby bombardment. To these birds our ship evidently meant a new and welcome perching place, especially at night. There were times when the sailors on anchor watch were kept busy heaving boobies off the deck into the nocturnal blackness of Chatham Bay. The men had the impression that the same boobies came back repeatedly, although new recruits were not wanting. The behavior of these birds convinced us that their name is a good one. They must have been the first to provoke the expression, "You boob".

One night Mert Mills, a member of the crew, came below holding in his hands a noddy tern. It had flown aboard, become fouled in the gear forward and was easily captured. Dr. Fisher smiled, put the event down as a case of easy pickings and promptly added the specimen to his collections.

Cocos Island is densely blanketed with perpetually drenched tropical vegetation. There are trees of good size, draped and festooned with vines and air plants, forming a curtain of brightest pasture green. Against this "drop" we saw tiny white specks moving in the air. As we drew closer they resolved themselves into birds—fairy sea swallows or terns—the first we had seen. They were flying singly or in twos and threes. Some carried small minnows in their beaks. Most were flying high and making for the, to us, inaccessible interior of Cocos Island. Those returning from that lush interior were seen to have no minnows. No cross-word puzzle could be simpler. I craved to photograph those birds but the only way to do this was to find a place where there were young or eggs. The opportunity came more quickly than I had thought possible.

Just west of Chatham Bay is a point of land on which a Cocos treasure seeker lies buried. Off the point, which is a high ridge, dark, shark-infested, turbulent waters race through a narrow pass. Beyond the passage is the small island called Nuez, steep as a tent and mantled by dark green mangroves. In these mangroves I found the fairy terns breeding. Against the almost solid ceiling of mangrove leaves, fifteen to twenty-five feet up, we could see pure white slender objects resting on limbs and in forks of upright trunks. These objects we soon saw to be living birds. They moved slightly as my sailor aide and I made our way cautiously up the stiff slopes through ankle-deep humus which was soaked with rain and liquid guano.

BARN SWALLOW

Resting on the rigging of the "Mary Pinchot"

THE MOCKINGBIRD IS FILMED

"P-e-e-e-e-t," he said, plaintively, as he hopped from twig to twig

It at first appeared the birds were merely perching but as we looked closer we found instead that each was covering an egg or a chick. There were no nests. The bird lays a single egg and balances it in a crotch or, more often, on a knot-hole, egg-cup fashion. She might well be called the knot-hole bird. How she balances that egg so nicely is a real egg-

laying marvel. She cannot see the knot-hole; she has to be a knot-hole expert. Hers is indeed remarkable marksmanship. Two or three weeks the egg remains balanced there, through all the comings and goings of its owner—through the blowings of tropical winds that sway the mangrove trees—until it hatches. Never did we see evidence that an egg had fallen.

Even more amazing would seem the hatching performance of the fairy tern chick who manages not to fall into space as a result of natal wrigglings. He is better than a contortionist disrobing atop a flagpole because the bird has had no rehearsal. Woe be to him if he falls, for the ground is alive with rats. On that knot-hole he remains until he is grown and can fly. These sea swallows are far gentler than doves. We climbed the mangroves and touched the birds while they incubated their eggs or brooded their young. A low, plaintive bleat and a slight ruffling of feathers were signs of puzzlement rather than protest as black beaks pecked us daintily.

When the *Mary Pinchot* was at anchor off the north shore of Indefatigable Island in the Galapagos Archipelago, Mrs. Pinchot came aboard one evening after a day on Seymour Island and told us a Galapagos hawk had alighted on her head. The next day I was shown to the site of this bird's home. The nest had been built on the shoulder of a bare ledge of lava rock. It was a tall structure, my tape showing it to be forty-two inches from base to rim. No doubt it represented an accumulation of installments built up over a period of years. Indeed, the annual accretions were plainly noticeable. Our own fish hawks and bald eagles have this same habit of cumulative nest making.

VERMILION FLYCATCHER
Snapped at Academy Bay on Indefatigable

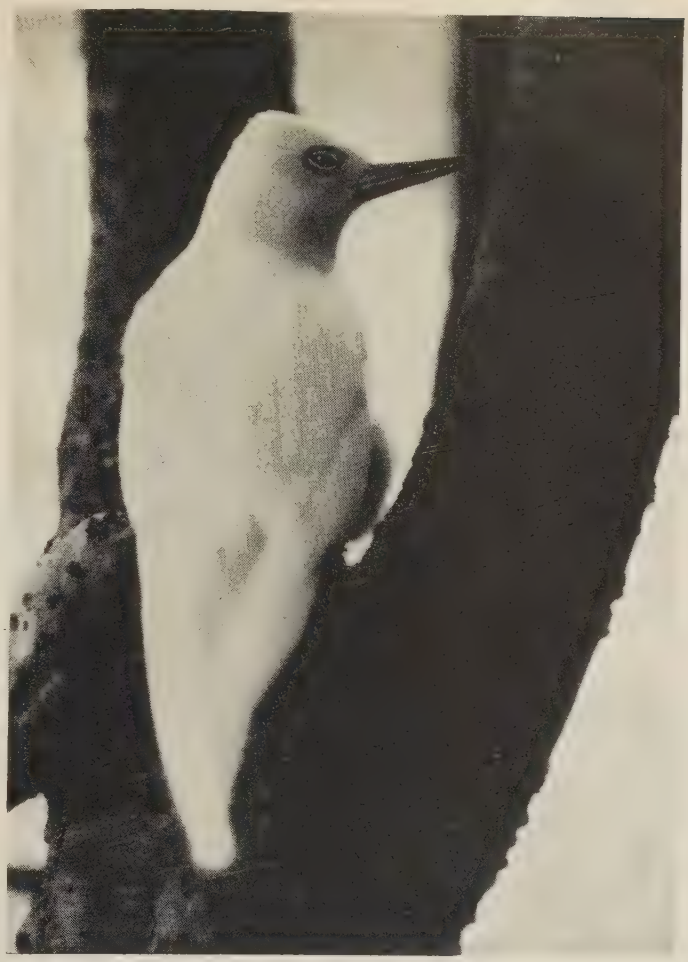
Madame Hawk was not at home when I arrived, but she soon appeared. With her came two husbands. She remained at the nest but a short time while her lovers perched in bursera trees nearby. In the nest a single egg, addled and stained, rested on a lining of yellowish, dried grass. The owner stood looking at this egg for a few minutes, bending forward now and again to touch it with her bill, but never settling upon it. Presently she took to wing, was joined by her slightly smaller admirers, and the trio sped away for a wild sky ride. The last I saw of them they were screaming and squealing ecstatically, circling higher and higher, becoming mere black dots in the heavens against a background of mare's tail clouds.

GALAPAGOS GROUND DOVES TAKE UP MUSIC
They beat a tattoo with evident glee upon an aluminum cup left on top of the haversack

On Hood Island, the most southeasterly of the Galapagos group, we met a Galapagos hawk wearing the streaked brown plumage denoting immaturity. The happy thought

MEMBERS OF THE LOCAL BIRD COLONY AT HOOD ISLAND
A pair of waved albatrosses, which were the main attraction on this southern island

occurred to Dr. J. B. Mathewson, physician of the expedition, that the hawk might welcome food. The doctor cut a slender stick, killed a small lizard, placed the kill in a fork at the far end of the stick and began a careful stalk toward *Buteo galapagoensis*. The bird remained on the dead stub where he was perched, regarding with curiosity the limp lizard as it came nearer. When within easy reach the hawk began to show some signs of animation, then suddenly thrust out a foot, grasped the lizard in his talons and flew away with it. We followed that bird from place to place for an hour, feeding him ready-killed lizards until he could take no more. They were easy pickings for him and we imagined that this hawk's first contact with man must have left him favorably impressed.



AND HERE IS ONE FOR RIPLEY

Believe it or not, this fairy tern is covering an egg laid on the bare tree limbs

Probably the main attraction on Hood Island is a colony of the splendid waved albatrosses. We walked among these large birds as they sat on their ground nests. They thrust their great corn-colored beaks at us, groaned and regarded us innocently. Their big, dark eyes looked out from under "eyebrow" feathers that gave them the appearance of an old southern colonel.

Just beyond the limits of the albatross colony live the Galapagos swallow-tailed gulls. They choose the low cliffs, caverns and rough lava boulders at the head of the beach. These birds were less afraid than are the gulls on the Pacific Coast of the United States, which is saying a very great deal. I wanted flight pictures of them but they would not fly! I took off my cap and waved it in their faces. They rose into the air but before I could whip my camera into place they were all settled on the rocks again. I poked my fingers at them, I yelled "H-E-Y", I said "S-h-o-o-o-o", I jumped up and down. I have no flight pictures of the Galapagos swallow-tailed gull.

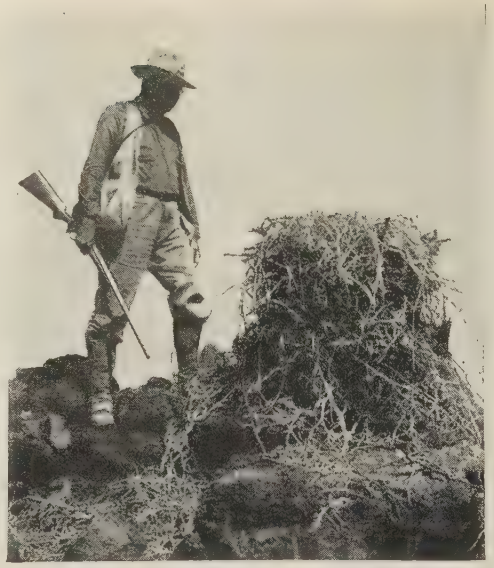
NO INFERIORITY COMPLEX HERE

The mockingbird takes up a place of vantage atop the hat of the former governor of Pennsylvania

In his book *To The South Seas* Mr. Pinchot devotes a chapter to "Inaccessible Indefatigable", one of the larger of the Galapagos Islands. The mountains of the interior have challenged explorers but none has ever reached them. We made our try but failed. The almost impenetrable brush, rough lava rock, cactus, spiny shrubs and heat are the worst items to be contended with. On this island, however, one may have diversion aplenty without even attempting to reach those distant mountains. During our trek toward the interior we sat down to rest after we had covered about two miles. Almost at once a mockingbird came into a bursera tree over head. These trees appear gray and dead during the dry

season, an appearance intensified by the absence of leaves. The tree sheds these temporarily to eliminate evaporation. Nick the bark, however, and sap flows freely as blood from a fresh wound.

The mockingbird said "p-e-e-e-e-t" plaintively as he hopped from twig to twig. Presently he came down on a branch close to G. P.'s straw hat. To the delight of all, he next hopped to the peak of that hat and remained there pecking at the ventilator eyelets which he evidently thought edible. With wild birds sleeping contentedly between his feet and perching on his head, we began to regard Pennsylvania's ex-governor as possessing the attributes of Saint Francis!



DR. FISHER INSPECTS A NEST

Suspends collecting to study abode of Seymour Island Galapagos hawk

BURSERA TREE AND OPUNTIA CACTUS

The leafless tree is at the left, and both are on Seymour Island

But at least a part of this was nothing but plain Galapagos, as all of us had occasion to find out for ourselves. When it came lunch time during the first day of that march we placed ourselves beneath another of those leafless trees, seeking what shade its bare branches afforded. After we had eaten we lay down for relaxation. The only sounds were those of our own breathing, of vegetation stirred by a stray zephyr, and of the birds gently lisping. As I was passing into that delightful floating state midway between waking and sleeping I felt a slight touch on my left sleeve at the elbow. A moment later something hopped upon my left shoe and began delicately pecking at the raw hide laces. By raising my head ever so cautiously and looking out of the extreme corner of my eye I was able to take in the whole situation. On my elbow stood a Galapagos mockingbird, while a Galapagos ground dove was at work on my foot. At the same time two Galapagos vermilion flycatchers and numerous Geospiza finches perched and prospected in the shrubs but a few feet away. While we were still resting in that spot more ground doves walked into our presence and began examining us and our goods. Within arm's reach stood my Norwegian knapsack and on top of it rested an aluminum cup. That object had to be inspected. Up climbed two doves to the peak of the knapsack and for some time thereafter we could hear the gentle tattooing of their beaks against the metal.

We spent a total of five weeks in the bewitching Galapagos Islands. So fascinating did each one prove that we left it with reluctance. We anchored at three different places off the shores of Indefatigable—at Seymour Anchorage, Conway Bay and Academy Bay. When we reached the last named place our time was so limited that we could do no real exploring. This was especially disappointing for the reason that when we arrived we learned for the first time of a trail which had but recently been cut from the coast toward those elusive mountains. Had we been able to spend a few days here we might have reached their summits after all.

Up this trail we went as far as one can go in the brief period of two hours or so. We reached a point possibly two or three miles from the landing and the trail still beckoned, but we could not respond to the call. On this trail, however, there were adventures waiting. Encouraged by the episode of the Galapagos hawk on Hood Island, Doc Mathewson now always carried with him a slender wand so that he might play with the birds. And play with them he surely did. His wand became a magic wand. So amenable were the birds that one might have thought them under a trainer's mystic spell. Having fallen behind to photograph immense tree cactuses, I was striding along the trail above normal pace when I saw Doc working his magic just ahead of me. He had discovered a ground dove beside the trail and by cautiously placing the tip of his wand beneath its body and gently lifting he had coaxed the subject to transfer her allegiance from earth to his stick.

Putting as much stealth as possible into my approach I sought to get within photographing distance, which would be six or eight feet. As I advanced I made all necessary adjustments on my (Continued on page 130)

GENTIANA BARBELLATA
Like a magic serving of pistachio ice cream
by unseen mountain elves

GENTIANA ELEGANS OF COLORADO
Here we have some surprising bushlets
luxuriantly covered with blooms

AND HERE BARBELLATA AGAIN
This time with more foothold and
with blooms in greater detail

COLORADO MOUNTAIN GENTIANS

BY LOUIS BRAND

PHOTOGRAPHS BY THE AUTHOR

IN LATE July the moist sub-alpine meadows of the Colorado Rockies are aflame with color. The bush potentillas with their yellow roses are grouped here and there in engaging clumps; the open places are carpeted with myriad fleabanes and painted cups; and along each runnel in the beaver country, larkspur and monkshood throw up their blue spires, and the little elephants disport themselves in airy grace. The brooks themselves reflect the yellow monkey-flower and pink willow-herb nestling among the stones. The fairy flax and the shy mariposa lily hide among the tall grasses. And if you lie down in the sweet grass you will see everywhere an inch-high androsace sprinkled with white stars.

But when August gets under way, this gorgeous flower carpet shows a new color pattern. A deeper blue first marks the borders of the little streams, then spreads gradually into the meadows, until at last all colors are overwhelmed by a blue invasion. For now

"The crisp and haughty gentians
In their annual conventions
Turning the meadow indigo"

can no longer be resisted. Now the beavers and the

WHILE THIS IS BEAUTIFUL GENTIANA MONANTHA

And forsooth it boasts a jolly elf of a lovely sky-blue flower

groundhogs boast a garden such as no man can call his own.

Such is the advent of *Gentiana elegans,* the Rocky Mountain fringed gentian. This bold annual, in the soft humus of the upland meadows, develops into surprising bushlets a foot high covered with blooms. Sometimes a single plant will carry seventy to eighty flowers. It is so exuberant in its high spirits that it even seems a little garish when contrasted with the lovely Mariposa now unfolding its last lilies.

As you climb higher towards the summits, this gentian appears wherever earth, water and sun are to its liking. Even at twelve thousand feet, scattered plants appear among the rocks, here at their very loveliest, graceful and restrained. Not a brazen display of many flowers, but a sparing two or three in a setting of silver-gray schist. We find our gentian in two moods; robustious in its happy meadows, refined and delicate on the heights, but always a thing of beauty. In the early morning the new blooms have a sweet fresh smell which is later dissipated by the noonday sun. The flowers depart from the usual gentian plan in having four instead of five petals.

After the fringed gentian has colonized the meadows, the cup gentian, *Gentiana parryi,* appears in little groups or as scattered plants here and there. This gentian is no upstart annual but a permanent resident with long, fleshy roots prowling deeply into the soil. Its cups of bright blue have five lobes and five pleats and the insides are spattered with purple. On cloudy days the cups are shut, but they open to take the sun. The flowers, sometimes solitary, usually end the stalks in a group of from two to five. An old plant with many flowering stems, on the edge of a grove of aspens, is certainly a most arresting sight.

IN THE MOIST SUB-ALPINE MEADOWS

In late July the little elephants disport themselves with airy grace

WHILE WAY UP ON THE HEIGHTS

There Gentiana romanzovii prefers to freeze up every night

The star gentian, *Gentiana plebeja,* is a boon companion of the cup gentian. It likes the same country and the same fare. The flowers form a small tube with five pointed lobes making a lilac-blue star. As each lobe has a tuft of hair at its base, a soft little brush projects from the center of the flower. This gentian will grow into a sizeable one-foot bush in partial shade, studded with myriad flowers. But high up among the splintered blocks of the Leadville limestone it is a tiny plant but an inch or two high, clutching at a wisp of soil in the crevices. There it pretends to the aristocracy of the true alpine flowers and disavows being only a plebeian gentian.

The green "gentian," *Frasera speciosa,* is a big, hearty

fellow five or six feet tall and loaded with several hundred flat flowers which are economically displayed a few at a time. *Frasera* is a biennial and has a nicely arranged time schedule; all the plants in our mountains are *in phase*. One year they all bloom, next year not a single adult plant is to be seen—only the whitened stalks of last year's crew standing up like scarecrows in the meadows. Mr. Farrer, in his *English Rock Garden*, calls it ugly and quarrels with *speciosa*. But ugly is not the word—grotesque is nearer right. I rather like the fellow and know him familiarly as Bill. As a rock garden denizen, *Frasera* is in a class with the hollyhock.

COMPANION OF THE ARCTIC GENTIAN

The suns of Rydbergia or the stars of the great rooted spring beauty make gay

If you search the tufted grass of the highest alpine meadows, in the region of twelve thousand feet, you may spy a jolly elf of a sky-blue flower, lifting its face to the sun. This little gentian, *Gentiana monantha*, has its giants a whole inch high. It loves the company of its kind and camps out near the source of the mountain brooks where the last turf struggles with the rocks. An even smaller gentian lives here, too, one that lies flat on the ground and hides its baby trumpets of blue in the grass. But to be quite scientific, this sprawling plantlet, *Gentiana prostrata*, is no longer a true gentian; the botanists have moved it from the proud genus and now speak of *Chondrophylla americana*, a mouthful for such a little fellow. But some flowers never stay put—a new doctor's thesis and lo, we may have *Gentiana sensitiva*. For if you pluck the flower it wilts before your eyes.

LOVELY GENTIANA ELEGANS

Not a brazen display but a sparing two or three flowers against gray schist

Going still higher to the last pool beneath the snow, or even to the rocky peaks themselves, we meet at last the arctic gentian, *Gentiana romanzovii*, a close relative of *Gentiana frigida*. This gentian has true mountain blood and disdains the soft life of the meadows; it prefers to freeze *every* night and chooses a wind-swept solitude for its abode with perhaps only the suns of *Rydbergia* or the stars of great-rooted spring beauty for company. A tuft of slender leaves sets off the lovely open vases, two or three inches long. They are greenish white with blue streaks on the pleats and purple dots within. The picture speaks of its loveliness, but does not show the dark mountain tarn in a cirque of towering rock, on the borders of which it lives and blossoms. With *Dryas* and the silver-cushion forget-me-not, *Eritrychium argenteum*, it is the gem of the upper solitudes. It grows alone or in sparse colonies, usually in a moist debris of rocks where the conies squeak and hide. Early September is its flowering time. It is delicate and sweet.

AND, FINALLY, THE CUP GENTIAN

No upstart annual but a permanent resident with long fleshy roots prowling into the soil

Now that autumn is upon us, the perennial fringed gentian, *Gentiana barbellata*, bids the summer farewell. As you pick your way among the last daisies and painted cups of the upper screes, you will note at times a pervasive odor suggestive of bitter almonds, like a magic serving of "pistachio" ice cream by some unseen mountain elves. This is the news that our latest gentian spreads of its whereabouts; welcome news indeed, for it is rare and widely scattered. This gentian huddles about the splintered rocks in twos and threes. Patches of only the deepest blue sky are used to make their four fringed petals. *Gentiana barbellata* is not as joyous as his brother *elegans* (who is now ripening capsules full of tiny brown seeds) but is just as lovely in a quiet way befitting the fall of the year. Among the dried tufts of androsace and arenaria, where dryas bloomed and now waves her plumy banners, the last of the mountain gentians gives us heart and tells us of other summers to come.

A FLOWER OUTCAST

ITS FAMILY HAS CAUSED ITS DISGRACE

BY WILLIS G. WALDO

THE ENGLISH PLANTAIN
Like most of the fifteen members of the family, it is classed as a weed

SEARCH as you will among the dozen or more popular handbooks which depict and describe American wildflowers, you are not likely to find listed the attractive flowerets shown in the illustrations. The writer has found but one such handbook in which it is mentioned.

The reason is that the English plantain, or ribgrass, *Plantago lanceolata*, comes from the Plantain family, a group of fifteen or more members, not more than three or four of which are commonly listed among our wildflowers. The remainder are generally regarded as homely weeds, adding nothing of beauty to the margins of footpaths or the untidy dooryards where they grow rankly.

Yet, as the pictures show, the English plantain is not without decorative value. The flower spike is much shorter than that of the common plantain, *Plantago major*, and the leaves, while strongly ribbed, as are those of all the plantains, are not broad and coarse but long and slender.

A GRACEFUL GROUP OF LITTLE HATS
Each nods from its stem for all the world like a Mexican sombrero

The spike does not all flower at once but progressively from the base upward. At the stage of maturity shown, the flowers have a characteristic and striking resemblance to the tall-crowned Mexican sombrero.

A particularly fertile spot in a meadow or pasture will often produce a graceful group of these little hats, each solitary on its stem or scape, some long, others short, thus affording a pleasing variety. The height ranges from eight to twenty-two inches.

Only where it can mature unstunted does English plantain present an attractive appearance. As commonly seen in dwarfed form in the city back yards and vacant lots, it is without attractive individuality and becomes merely an unlovely weed.

ON THE EDGE OF THE MARSH
The handsome avocet waits for the photographer to leave

AVOCET ISLAND

WHERE BEAUTIFUL BIRDS RAISE THEIR YOUNG

BY JOSEPH B. HALM

A SIMPLE CRUDE NEST
Yet the speckled buff eggs are hard to find

"OH DADDIE, Daddie, the avocets are back, the avocets are back. Come quick, an' see 'em." This from our five year old daughter, Ruth, who came running breathless from the lake. I halted in the act of relieving our old car of a load of camping equipment. Sure enough! hovering over a tiny island in the lake I could make out a number of black and white birds. There was no mistaking them. Hurriedly I completed the unloading and unpacking.

As we walked to the shore, the little hand in mine kept tugging and urging me to hurry. "There they are, Daddie. Aren't they wonderful?" A number of the graceful, stately birds were wading and running about the shallow water of the little bay, scooping left and right with their long curved bills. As we approached, they arose, and circling, came directly over us with their shrill metallic cries, "pl-ink—pl-ink—pl-ink." The circling was repeated; then, apparently having vent their feelings on the intruders, they flew to the little island which we had previously named Avocet Island.

We had come to our little hunting lodge on Nine Pipes for an outing, and to study and photograph ducks and other wild bird life. Nine Pipes, a large man-made lake, is located in the heart of a rich agricultural valley, near the foot of that famous and picturesque Mission Range in western Montana. It is a National Bird Refuge from the first of January to the middle of September each year. Within its bounds, a variety of migratory and upland birds nest and rear their families without fear of molestation.

It was late afternoon. I launched our portable boat and pulled for the island. As we approached the grass and weed-covered little spot, a great commotion arose. Sandpipers, killdeers, terns, avocets, gulls and blackbirds screamed and circled overhead. A number of coots darted into the water; a dark object crept stealthily from a thicket of thistles and wild mustard; in a moment there was a flutter and a scaup was zigzagging across the water. Surely this was a treasure island—just a dot in the lake, scarcely larger than a city lot, yet how rich in bird life!

I drew the boat up, then cautiously parting the weeds, we took a peep into the scaup's home. Nine buff eggs with just a tinge of green were carefully arranged in a feathered and grass-lined nest, so cleverly concealed that had I not seen the mother leave, I doubt if we could have found it.

The air was now literally full of screaming birds, swooping and darting hither and thither. Apparently indignant at our intrusion, they were indulging in all sorts of strange cries and antics. Cautiously we walked about the island, scanning the ground carefully lest we

SETTLING DOWN
The mother about to brood her eggs

THREE BABIES
From fifteen to sixty minutes old

A COMING OUT PARTY
The egg at the right has just been pipped, and the prisoner works industriously

destroy some feathered creature's home. Among the dry grass in little depressions in the ground, we found the killdeer nests neatly lined with fine grass, their four small speckled eggs exposed to the elements. Ruth had just discovered two newly-made blackbirds' nests in the reeds and was beckoning excitedly. Avocets' nests were everywhere—some were just beyond reach of the lapping waves of the lake, others scattered here and there all about the island. They were constructed of a few dry reeds and sticks laid in a haphazard way on the ground. The tern is almost as careless a nest builder as the avocet, if either can really be called careless. Nature probably taught these birds that elaborate nests would be more readily seen and might therefore lead to their destruction. Both nests are extremely hard to locate due to their simplicity and the speckled buff eggs that blend so neatly with the background as to escape anything but the closest scrutiny. The size, shape and number of eggs are the distinguishing features. The avocet will usually lay four eggs while the tern is content with but three.

I had previously made several dummy cameras of small squares of boards covered with black paper with a round white spot in the center. These, with each mounted on two legs, made fair imitations of cameras. The birds soon grew accustomed to them when placed near the nest and readily accepted the camera which I afterward substituted, saving me many hours of patient waiting. After carefully setting one of these dummies near a convenient avocet nest, I built a small blind of sticks and burlap, some thirty yards distant, which, when completed, resembled a miniature Indian tepee, low and inconspicuous.

The next morning I returned to the island alone; there was the same confusion and clamor of the previous evening, and a screaming, scolding throng. Several cranes went flapping away and their hoarse cries added to the uproar. I replaced the dummy with my camera, arranged a trip line of strong thread, and crept into my blind, which really proved to be more of a sweat house than a tepee. Ordinarily a two hundred pound man cramped into a three by three mosquito hive with a broiling sun above and no ventilation would be anything but comfortable; but in my excitement I forgot the heat, the gnats and mosquitoes. Trembling and expectant I waited for the return of my quarry. Screened by the burlap I had a good view of everything about me without myself being seen.

A number of avocets settled in the water and swam through the rushes toward me; emerging, they eyed the blind and camera with mild suspicion. As they became more at ease, they began running about, crossing and recrossing each other's paths. Occasionally one would jump playfully over another, kicking down with her long legs as she passed; others waded along the shore, jabbing here and there about the water for food.

One bird seemed more perturbed than the others about the camera, which she passed several times and viewed with distrust. At last, as if drawing on all her courage, she hurried direct to the nest of precious eggs. All were safe. Her courage suddenly failed her; she ran a few feet and was off, shouting at the top of her voice. She again emerged from the rushes a few moments later and after circling the camera, made another dash for the nest—but again courage failed. The third time,

however, intrepidity conquered; stepping carefully over the nest, she turned deliberately about several times, then lowering her breast feathers, she settled over the eggs. My nervous fingers tripped the graphic. At the click she was gone as were some score of others that had returned to their nests while I was intent on the one. I reset the camera and returned to resume my sweat bath. A field mouse peeked at me curiously from beneath the burlap; several birds including a gull lighted on one of my tepee poles within reach of my hand, while a killdeer persisted in stumbling over my trip string.

The avocet, for all its clownish antics, is a serious minded bird, eyeing one with questioning wonder, and displaying neither anger nor fear. I have several times watched one alight at some distance, partially submerge its body with scarcely more than head and tail visible and swim toward me, until partly concealed by rushes; then, with head low, it crept stealthily nearer and nearer, until, when only a few yards away it raised its head slowly and bobbed up and down, as if trying to attract attention. All the while it eyed me with a quiet, interrogative look. Then, as if on a dare, it would run a few feet in my direction and again resume the bobbing. Or sometimes it would squat, lowering its head almost to the ground; after a moment, if I did not move, it would rise. Then as if another thought had just occurred, one wing dropped as if broken, while the other was extended rigidly, and in a most distressing manner, it wallowed and hobbled away along the ground toward the water, all the time keenly alert for the least movement on my part. If I followed, it imitated the ruse of a nesting partridge. When a safe distance away, it would take wing, followed by a score of friends; then back they all would come, almost directly over me, always emitting their queer metallic cries: "pl-ink, pl-ink, pl-ink."

Being anxious to examine one of these birds, I arranged a noose of a light cord in the shallow water. In a few minutes I had a living kite on my string. As I drew it down gently, the trembling bird ceased its struggling and remained quiet until released. I found it tallied very closely with descriptions which I had read, being slightly over seventeen inches from the tip of its bill to the end of its tail, and having a twenty-one inch wing spread. The long, black, upward-curved bill was more than four inches in length, while the slender blue legs from the end of its webbed toes to the body measured nearly a foot. Its white body, black and white wings, and reddish orange head and neck, set off with a whitish ring about the eye, gave it a most distinctive and, surely, a most striking appearance.

THE LITTLE BAY AT NINE PIPES
Avocet Island is in the foreground, beneath the slopes of Montana's Mission Range

THE AVOCET ON HER NEST
She raises her breast feathers to cover the eggs with her bare breast

Upon my return each successive week-end, I found many new and interesting developments. By the middle of May, the killdeers had almost all abandoned their nests. Little long-legged strangers were running about helter-skelter, in the shallow water. The baby killdeer is a very erect and dignified little gentleman, a good runner and wader, but rather a poor swimmer.

Toward the latter part of May, I had the good fortune to arrive just in time to witness hatching day activities in the avocet colony. The birdlings pip the eggs from within, burst the shell and roll out, damp, squirming, little creations. It was marvelous how quickly those tiny fellows developed into fluffy, downy balls, and tottered about on their wobbly legs. In just thirty minutes by the watch, one little fellow wrig-

gled clumsily into the water. Ruth was frantic. "Don't let it go," she cried, "the poor little thing will drown." No sooner was it in the water than the tiny bird, with confidence and ease, swam swiftly to its coaxing mother.

Unlike most birds when startled, the adult avocet will fly away some distance, then return, offering a most tempting target for the gunner. Though not a game bird, it has long been a coveted mark for certain types of hunters. Notwithstanding the Federal Migratory Bird Law, which prohibits the killing of avocets, hunters still persist in training their guns on these rare and beautiful birds, threatening their complete extermination.

SWEET BAY—A MAGNOLIA BY DR. E. M. GRESS

SWEET BAY is, indeed, an appropriate common name for this shrub whose fragrant, beautiful flowers often reveal it by odor before it becomes visible. Like many beautiful shrubs and herbaceous plants its popularity is conducive to its destruction. In New Jersey in June, "the atmosphere of the Pine Barrens swamps is heavy with the perfume of the magnolia, *M. glauca,* and we recognize its presence long before we detect the creamy, cup-shaped flowers nestling among the shining green leaves. Unfortunately magnolia flowers have a market value, and the curbstone flower venders of Philadelphia ruthlessly strip them from the trees, often breaking the latter to such an extent as to permanently ruin them."

FLOWERS OF THE SWEET BAY
As fragrant as they are beautiful, they are often destroyed

Among the common names of this shrub is beaverwood, because the roots were eaten with relish by the beavers; indeed they are so fond of them that they could be caught in traps baited with the roots. Michaux relates that the wood was used by the beavers in constructing their dams and houses in preference to any other. Sweet bay is sometimes called swamp magnolia from its habitat; also laurel magnolia because of the resemblance of its leaves to those of laurel.

In the South the leaves remain on the tree during winter, and it may grow to a height of fifty feet. In its northern limits the leaves drop off in the late fall and it is only a shrub or small tree. The leaves, flowers and fruit are so distinct that it is not difficult to distinguish it from any other shrub.

The alternate, entire leaves are bright green and shining above and pale or almost white beneath. The underside of the leaf is usually described as being glaucous from which the shrub gets the second part of its scientific name "glauca." The leaves are from three to six inches long and from one and one-half to two and one-half inches wide, oblong in shape and only slightly pointed at the base and apex.

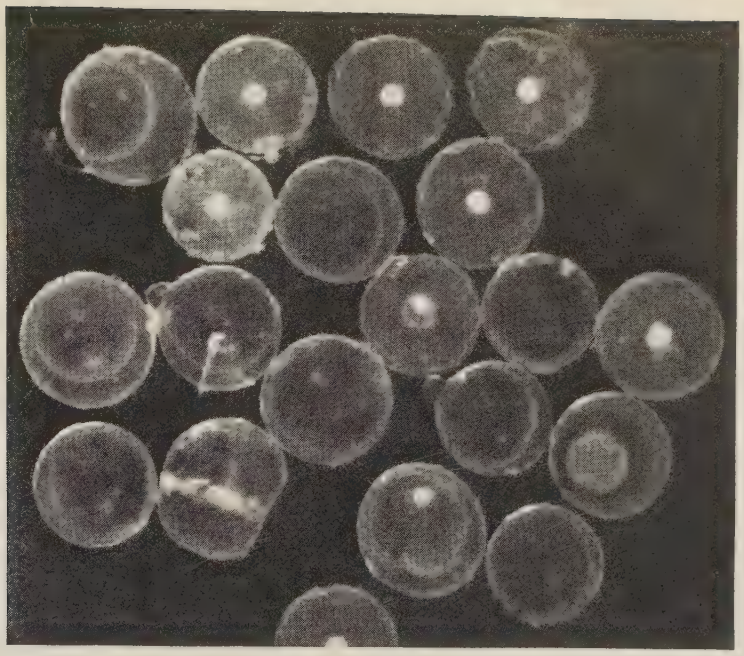
One of the interesting characteristics of this shrub is that the blooming period is extended. It begins to bloom in May, and open flowers may be found as late as August. Each flower is a cream-colored cup about two inches deep and three inches across, composed of three pale sepals and six to nine petals. On the inside of this cup are numerous stamens and a compact cone on which the many pistils are grouped. Altogether it is a lovely flower.

In autumn the fleshy, knotty, irregular or pear-shaped fruits are mature. The many seed pods or capsules are embedded in this fleshy fruit and when the seeds are ripe each capsule bursts open and one or two seeds slip out, still attached to a slender thread. These scarlet seeds dangle on the slender threads and if not eaten by birds are finally scattered about. In strong winds some of the seeds may, indeed, be carried some distance from the parent plant.

Sweet bay is found along the coast from Massachusetts to Florida and along the Gulf to Texas. It seldom extends very far inland. However, it seems to have migrated inland in a few places.

Among the relatives of sweet bay are many species of cultivated magnolias, as well as the cucumber tree, *M. acuminata,* and the umbrella tree, *M. tripetala.*

Is it possible to dedicate to a man a more beautiful memorial than has been given in honor of Pierre Magnol, a famous French professor of botany, by naming for him this magnificent group of trees and shrubs "Magnolia?"



FOUR DAYS IN THE EGG STATE
Young vesicles and undeveloped eggs of the opossum at ninety-six hours

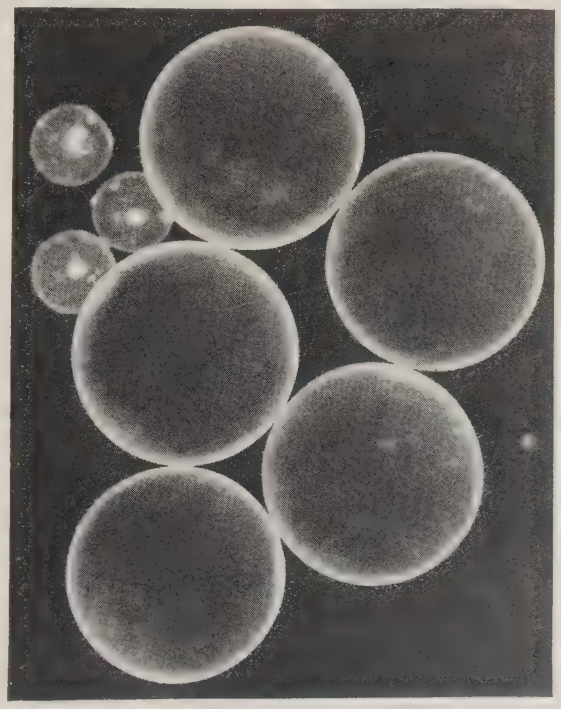
THE STORY OF THE BABY OPOSSUM

BY CARL G. HARTMAN

PHOTOGRAPHS BY THE AUTHOR

Among the many questions asked of the editors of Nature Magazine one of the most frequent has been "Whence come baby opossums?" We are delighted to answer this question, and dispel erroneous notions through this excellent article and with the author's remarkable pictures

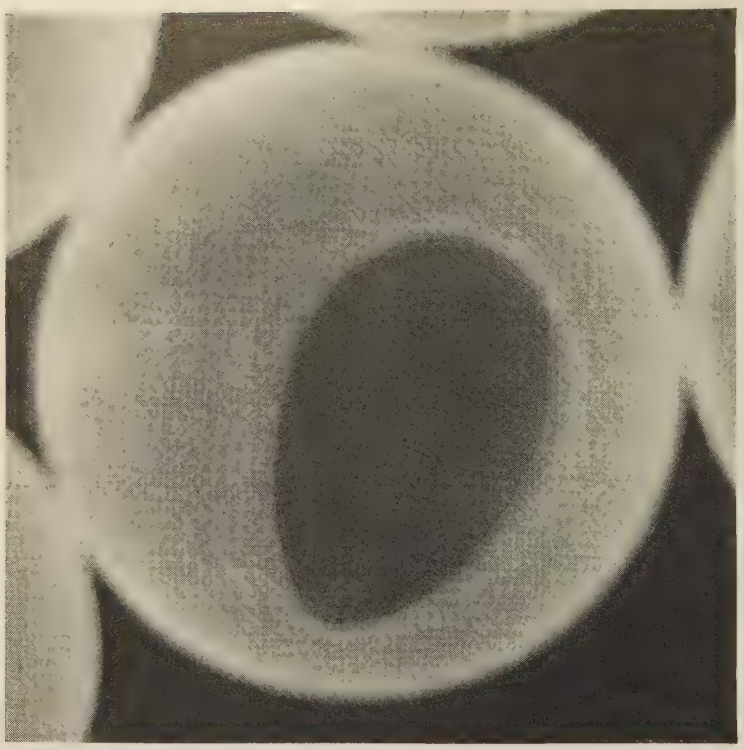
IN SOME respects the opossum is the most remarkable animal in America. It is the only marsupial or pouched animal of the New World; the kangaroo and other near relatives all live in Australia. The pouch of the female is a fold of skin stretched around eleven to fifteen milk glands on the lower abdomen in a region corresponding to the cow's udder. The pouch may be closed by ring muscles much as a tobacco sack may be closed by pulling the string; in this way the tiny babies may be guarded against cold and other dangers. Shelter, warmth, and food the opossum babies find in this admirable contrivance of Nature designed for the care of her children that are born



FIVE DAYS' DEVELOPMENT
In that period the vesicle grows to the size of a poppy seed

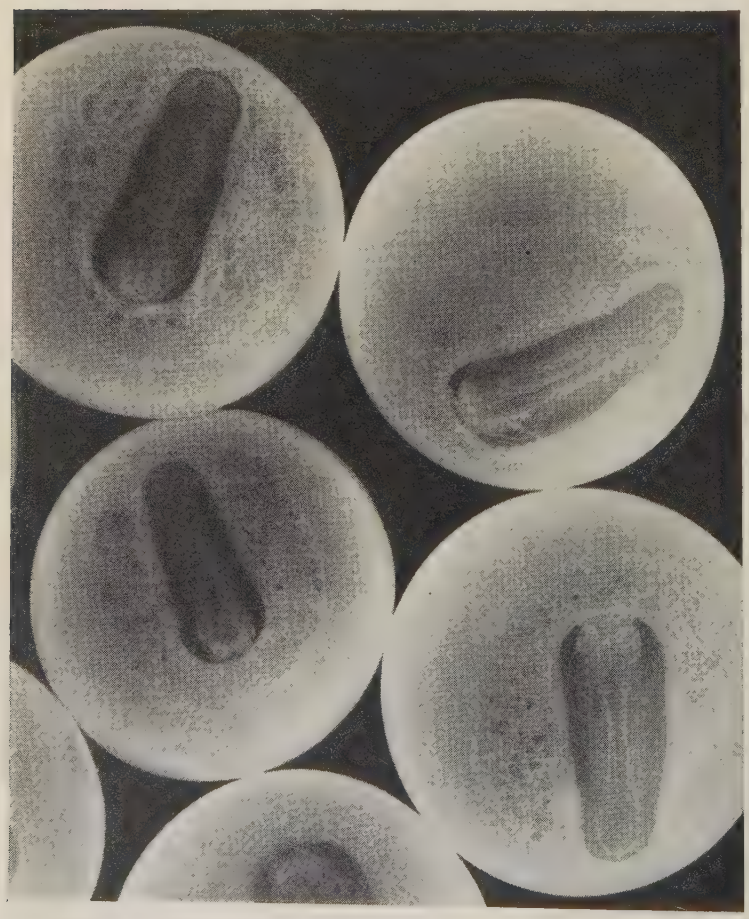
younger and in most respects less developed than any other mammal babies in the world. It is this early birth that astonishes both the naturalist and the casual observer of Nature's ways.

No wonder, then, that strange traditions have arisen about the generation of the opossum. One story has it that the mother blows the babies into the pouch from her nostrils; another notion is that the young come directly out of the nipples that are in the pouch. How the opossum develops, is born, and reaches the shelter of the pouch can be easily told today, since the interesting details have recently been discovered. We are, moreover, fortunate in being able to present actual



OPOSSUM EGG SHOWING PRIMITIVE LINE

At six days the embryo is about to start to be born 6½ days later. The size of the subject here is that of a mustard seed

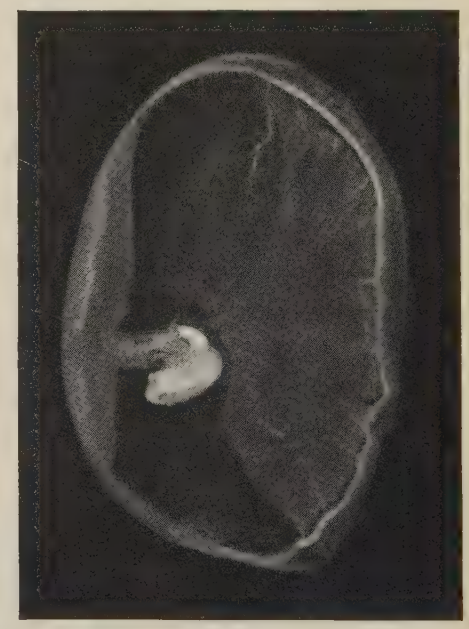


PROGRESS AT SEVEN AND ONE HALF DAYS

Here, magnified six times, we have the flat embryo beginning to take on the form presaging the arrival of the baby

pictures of the opossum eggs photographed in the living state immediately after they were removed from the animal. For like every other animal the opossum, too, comes from an egg. The reader can see pictures of the egg soon after it comes from the ovary and later while it is developing into the baby opossum ready to be born—all of which takes 12½ days only.

To understand the pictures of the opossum egg, which is extremely small, comparison should be made with the hen's egg. In the middle of the hen's egg is the yolk; this is the egg proper, much enlarged because of food stored up for the developing chick. Around the yolk there is a layer of albumen or egg-white—more food and some water. The whole is surrounded by a shell membrane and a hard calcareous shell; the shell



THE EMBRYO AT EIGHT DAYS

Within its vesicle and supplied with blood vessels

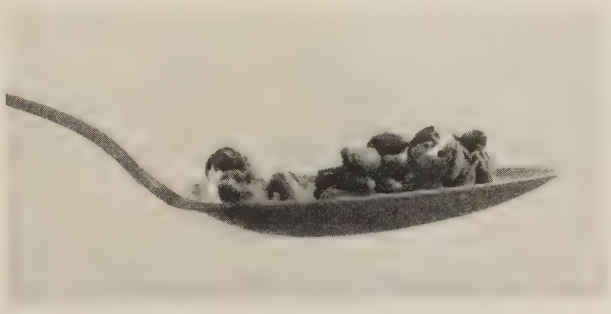
membrane one can notice in a hard boiled egg from which it is easily peeled off after the shell is cracked and removed. The tiny opossum egg has a shell membrane but no hard shell, for it is not "laid" like a hen's egg but develops in the delicate uterus inside the body. Under the shell membrane, as may be seen in the pictures, there is a thick layer of albumen, as clear as a dew drop. The egg proper may be seen in the center as a white opaque object. It is so small that 170 of them laid side by side like a string of beads would be required to make an inch; a thimble, small as it is, is big enough to hold half a million. The whole egg with the egg white is, of course, larger. From such a tiny speck, just visible to the unaided eye, an opossum ready

for birth develops in 12½ days.

At first the egg itself is a single cell. This soon divides into two, four, eight cells and so on. The cells arrange themselves into a hollow sphere or vesicle. This grows and becomes very thin-walled and filled with liquid, a most delicate, beautiful structure, as may be seen from the pictures—like soap bubbles or fragile fairy balloons blown by a magician. They are indeed more than magical—they are Nature's products and hence more wonderful than fairy tales can conjure up. They are living things. What miracles take place in them in the course of a very few days!

NEW BORN BABY OPOSSUMS
Fourteen out of a litter that totaled eighteen

When the vesicle is the size of a poppy seed the place where the embryo opossum is about to start its development is indicated by a round disk of cells which are thicker than the others. This round disk becomes pear-shaped when the vesicle is the size of a mustard seed; and a line appears running lengthwise in the pointed end of the pear-shaped area. This is the signal for the embryo to start its development, for there is, up to this point, not a trace of an embryo opossum —the egg has only been getting ready for this event. Yet six days have already been spent in this preparation out of the 12½ days which Nature allows for the whole process. In other words in 6½ days after the embryo proper starts its development it must be well enough developed to be born into the world and take its first journey, the journey into the pouch for food and shelter!



JUST A LEVEL SPOONFUL
When born a litter of eighteen babies will find room in a teaspoon

GREATLY ENLARGED
Newly-born baby like those in the teaspoon above

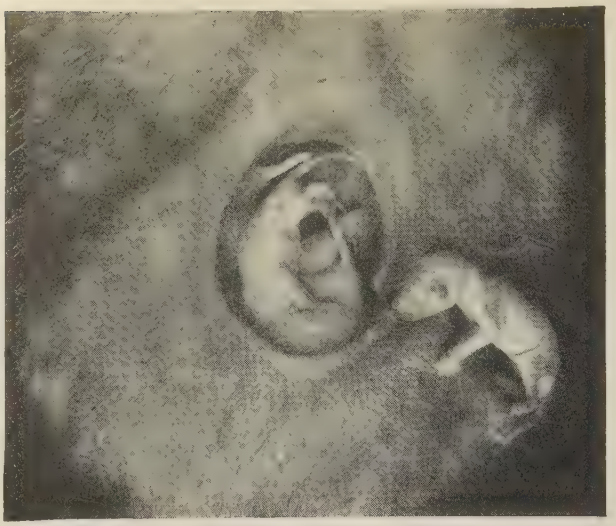
OPOSSUM LUNCHING
Week-old baby at work at the milk glands of mother

The first organ to make its appearance in the opossum, as in the chick and all other animals, is the brain—it comes in front of the streak of the pear-shaped area already mentioned. By examining the pictures the reader may see that the opossum develops on the surface of the liquid-filled sphere or vesicle just as the chick develops on the surface of the yolk, which is semi-solid in that case. Soon the body form takes shape and as it needs more room it dips down into the hollow vesicle. The vesicle grows to accommodate the larger embryo and it also becomes provided with blood vessels with which to come into close relation to blood vessels of the mother to get food therefrom and give off waste. But there is never an elaborate system for getting nourishment from the mother for long; hence the baby opossum must the sooner find its food outside the body, namely its mother's milk. So small are the opossum babies at this time that a litter of eighteen, as the picture shows, may rest secure in a teaspoon. Such a whole litter weighs one-fifteenth of an ounce—270 opossums, living, breathing, digesting animals together would weigh one ounce. They are less developed than mouse babies, which themselves, as every boy knows, are blind, helpless bits of pink flesh. One cannot speak of such babies as "seeing the light of day" when they are born, for opossum young do not have their eyes open for the seven or eight weeks that they are in the pouch attached to the teats —and well must they hold on, for their life depends on it.

How does so poorly developed a baby reach the pouch and find the teat, for this it must do or die? It was formerly supposed that the mother very skilfully and delicately caught the young in her lips and placed them in the pouch and on the nipples. That's the story one finds in many Nature books still. But this was a mere guess that happened to be proved wrong.

If you will examine the picture of a newly born opossum you will note the mouth and the nostrils surrounded by a peculiar "muzzle." The front legs and feet demand special attention, for they are highly developed and pro-

vided with sharp-hooked claws, while the hind feet are mere buds or pads. The facts are that when the baby opossum is born it crawls into the pouch by itself, and it is for this first journey that it has the well developed front feet. I saw it do this with my own eyes. It travels with a hand-over-hand motion like the stroke of a swimmer. It moves about until its muzzle touches the nipple and then it takes hold and, believe me, it continues to literally "hold on for dear life" for nearly two months. In one of the pictures is seen a baby a week old attached to a nipple. Another picture shows a "pouchful" of babies over three weeks old still helpless as at birth.



IN MOTHER OPOSSUM'S POUCH

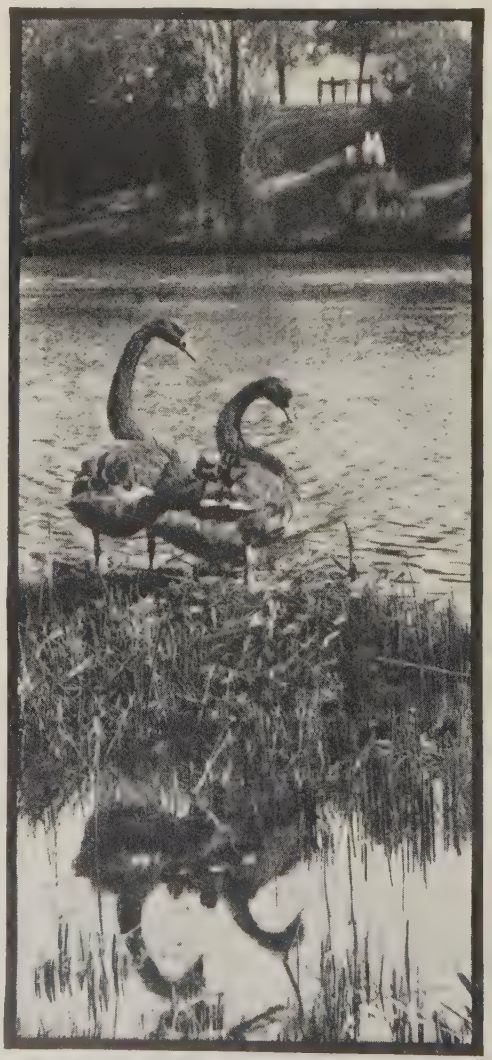
This is where the mother carries her litter, now three weeks old

At two months the young have a fine coating of hair, their eyes are open and lips completely separated. They are now cute and interesting as they scamper about on the old one, holding on to the mother's rich fur, as she lies basking in the sun on a hollow log that constitutes their den. Or at night when she prowls around for food for herself and her family they hang on tenaciously lest they be brushed off by passing shrubbery. In another month they hunt food for themselves, but still for some time like to have mother about for protection and perhaps for some instruction in the ways of life, for many problems of food-getting must be solved.

BLACK SWANS

NATIVES OF AUSTRALIA

BY KILROY HARRIS



AUSTRALIA is the only country which has a black swan. It is the national emblem of one of the States, Western Australia, and before the Australian States became a Commonwealth, in 1901, when each state issued its own postage, the black swan was pictured on all Western Australian stamps. The birds are still very plentiful, and in some states they are protected by Act of Parliament. They are found on all lakes, and are very tame. In Tasmania, however, there is an open season for swan, and thousands are shot.

One of their nesting places, Swan Reach, in Tasmania, presents a wonderful sight in season. The water is shallow, and the swans' nests, consisting of big hollow mounds of grass and aquatic vegetation, are everywhere. In the early days of Australian settlement, the native aboriginals depended greatly on the swan and its eggs for food. Close to Melbourne, on Swan Island, are acres and acres of ground covered with egg shell chips, evidence of hundreds of aboriginal feasts of this native delicacy indulged in many years ago.

EBENEZER OR— PARDON ME— ABIGAIL

AT ANY RATE IT WAS A GANNET OFF ITS COURSE

BY HARRIOTT CHURCHILL

ILLUSTRATED BY PHOTOGRAPHS TAKEN BY THE AUTHOR ON THE SCENE

SURVEYING THE SITUATION

Ebenezer-Abigail, the proud gannet, takes a look at Oberlin's reservoir system

"HAVE you seen the gannet yet?" asked the Ecology Instructor. The Senior Girl looked at him reprovingly.

"What gannet? Where?"

"The gannet up at 'Prof's.' "

The Senior Girl looked still more reproving.

"This," she said quietly but firmly, "is Oberlin, Ohio. A gannet, if I correctly remember my three courses in ornithology, is distinctly a marine bird. What would a gannet be doing here?"

The Ecology Instructor shook his head.

"I don't know. But the fact remains that about November 7 a fisherman saw this bird in Lake Erie at Oak Point. He thought it was some sort of a loon. On the 9th a Dr. William Schaeffer, a dentist who lived at Amherst, saw it; and he suggested that the fisherman catch it with some fish tied to a line. The capture was made, and Dr. Schaeffer took the bird to a friend of his, Rev. Eastman, who identified it as an immature gannet gone off its course. Eastman called 'Prof.' He didn't think they were right and went to Amherst. He had to admit it was an honest to goodness gannet, *Sula bassana,* and he brought it back with him.

"Want to see it? We thought first it was the only one ever reported for Ohio, but by digging into the records we think there was one reported at Painesville in November, 1925."

"Of course I want to see it." The Senior Girl started for the door. "And if you decide to do any experimenting with it, please tell me. I want some pictures, and I want to be in on the fun. There ought to be lots of that."

A few minutes later she was climbing the stairs of a workroom-loft. When she reached the top step she stopped and looked into the gray half-light. For all her glib remarks about gannets, she was not at all certain what sort of bird she was going to find. A faint sound focused her attention on an old rocking chair. Just beyond she caught the dim outline of a bird whose plumage so blended with the gray light of the loft that it was only just discernible.

"So this is a gannet!" the Senior Girl murmured as she stood looking down at the large bird which reminded her very strongly of a once well-to-do man who has lost his fortune and sits in the chimney corner of his daughter-in-law's house. Although she came quite close, the gannet did not offer to move but looked at her with a grave and slightly questioning air.

"I believe I could touch you and you wouldn't care," she addressed it, "but your bill looks very business-like, and that loon last year wouldn't stand for any familiarities."

The gannet shifted its position slightly and appeared to think. The Senior Girl went away.

Late in the afternoon the gannet had more visitors, the Ecology Instructor and three students. The Senior Girl brought up the rear. The bird was taken from the loft, put in a gunny sack, and then, with a good deal of fumbling on the part of the men and a good deal of kicking on the part of the gannet, a piece of fine hemp rope was tied about one of its legs. No chances were taken.

"For gosh sakes, tie that thing on good and plenty," panted the Senior Boy.

"Don't tie it too tight," warned the Senior Girl.

"If the blame thing gets away, 'Prof' will flunk you," the Red-headed Boy remarked loudly.

"Now," the Ecology Instructor stood up and surveyed his students, "who'll carry the bird?"

"I will," volunteered the Sophomore Boy.

He picked up the wriggling and impatiently bouncing bag and started for the car, the rest of them trailing after him. Once in the car and on the road, the gannet renewed its attempts to find freedom from the irksome bag. The heavy black bill forced its way through the loose meshes of the burlap and snapped angrily. The Sophomore Boy found himself very busy trying to keep the energetic bag on his lap and to tie the hemp rope to a finer cord.

The car stopped, and the Sophomore Boy scrambled out, the bag under his arm and started for the reservoir pond. Half way there he stopped and looked round.

"I say, let's call him Ebenezer," he suggested.

At the edge of the pond the party halted. Ebenezer was released from the bag and proceeded to walk up and down with an air of injured dignity. Every now and then he spread his long, strong wings, and flapped them as though to get out the kinks. He shook his feathers into shape and, unmindful of the string about his leg, waddled along with that peculiar hitching gait that seems to be characteristic of most birds with palmate toes. His general color was a grayish or brownish-black that had no sheen. Above he was mottled and below he was streaked with the white that in later life would be his chief coloring, only the wing tips remaining black. When he opened his bill and half croaked, half screamed "gor-r--r-rok" at them his tongue and the lining of his mouth showed gray instead of red.

TRYING OUT THE YOUTHFUL WINGS

They worked and the gannet was able to make a short flight

The Red-headed Boy and the Senior Girl were very busy taking pictures, and Ebenezer continued his promenade looking at them with a curiously grave and dignified expression.

"That's enough pictures for now," said the Senior Boy. "Let's put him in and give him a swim."

The tow line was reeled in; his wings were held close to his body; and Ebenezer was launched into the quiet waters of the Oberlin reservoir. Once in he appeared perfectly at home. He paddled with short, vigorous strokes out toward the center of the pond and looked about him with a good deal of interest. A transient merganser flew out of the water and flapped over to the west pond. A pied-billed grebe taxied across the far end of the pond as though startled to find such a visitor in such a place.

"I'LL TOSS HIM"

Said the Sophomore Boy most valiantly

But Ebenezer suddenly became aware that he did not have all the freedom of foot he was used to. That string bothered and annoyed him. He turned and pecked at it viciously with his efficient black beak. He rolled clear over on his side until half of his light belly was out of the water as he struggled to get rid of that nuisance of a string.

"Do you suppose he'd stay here, could stay here and get along?" asked the Sophomore Boy.

The Ecology Instructor shrugged.

" 'Prof' says he doesn't think Ebenezer could get along if we took him back to the lake. The murres that have run in there every once in a while always die. He thinks that marine birds' insides can't manage fresh water fish. Another proof that adaptation to conditions is slow.

"Let's pull him in," as the gannet showed renewed energy in his swimming.

Then came the surprise for Ebenezer. He had been going strong toward the opposite shore when suddenly a gentle but nevertheless determined force began to pull him in another direction. Ebenezer swung round to port and backwatered vigorously but to no purpose. Finding that his efforts would

not get him to the place of his desire, he quietly went whither circumstance and the string were pulling him.

"Wonder if he'd fly if we tossed him into the air," the Red-headed Boy asked.

"I'll toss him," volunteered the hardy Sophomore.

Ebenezer's wings were once more tucked close to his body. The Sophomore Boy stood close to the water's edge and tossed the gannet lightly into the air. The great wings spread; the heavy body adjusted itself; and, in the short distance he had to go, Ebenezer made a very creditable though somewhat splashy dive, going completely under water with his wings still half spread. He came to the surface again almost immediately, shook himself and paddled around a bit longer as though he didn't think that was such bad sport.

In fact he thought it was such good sport he objected strenuously to being taken from the water. The strong wings flapped furiously for a moment or two. The Senior Boy can testify that a "sock" with a gannet's wing can make one's jaw tingle quite uncomfortably. But Ebenezer thought better of his madness and became again the self-controlled, quiet gentleman.

"What are you going to do with him?" asked the Senior Girl as they strolled back to the car.

"I don't know. Drop around to the lab in a day or two and 'Prof' will know by then," said the Ecology Instructor.

Two days later the Senior Girl appeared in the laboratory and inquired for Ebenezer. The Ecology Instructor grinned.

"Well, since he probably wouldn't have survived very long if we had turned him loose, and since he wouldn't eat our menu, and since he's probably the second one reported for Ohio, 'Prof' put him to sleep and is going to make a monument of Ebenezer to Ebenezer."

"Oh," said the Senior Girl.

"The amusing part of it all is," went on the Ecology Instructor, "that he wasn't an Ebenezer at all. He was an Abigail."

"Oh," said the Senior Girl. And she went away.

ENDURANCE

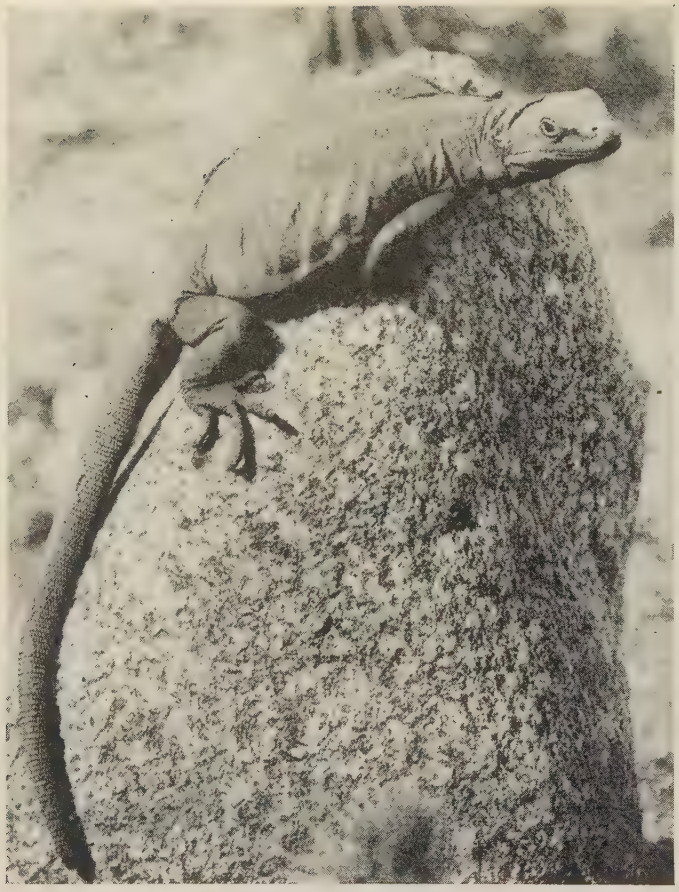
A CALIFORNIA OAK FIGHTS FOR LIFE

BY FRANK THONE

TREES that grow in semi-desert places often display remarkable powers of resistance to drought and general endurance under hard conditions of life. Though less beautiful than their neighbors they deliver the desert from absolute sterility and nakedness. Such a tree is this gnarled and crooked California live-oak.

The acorn from which sprang this dwarf fell—or was placed by a chipmunk—in the cleft in a granite boulder, where there was scarcely an inch of soil. The little oak kept up the struggle, each winter gathering the moisture that trickled down the vertical groove on the rock face, each summer grimly holding out against the long thirst of the dry period. At last the tip of the root reached the soil at the base of the rock, and things were a little easier. Now it grew much more rapidly, until the thickened root completely filled the crevice where it had first strained and struggled for its scanty livelihood.

Stunted and malformed though the tree is, it has probably passed the century mark, and is good perhaps for another century—an uncomely, unnoticed monument of vegetable heroism.



DESERT CHUCKWALLA ON HIS ROCK
It is one of the largest or longest true lizards now to be found in the United States

THE CHUCKWALLA

ONE OF THE LARGEST LIZARDS OF OUR SOUTHWESTERN DESERTS

BY VERNON BAILEY

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PHOTOGRAPHS BY HOAG AND FORD

DURING the warm and steamy *Age of Reptiles,* when thousands of huge creatures with naked skins or scales or armor plates inhabited North America, a little lizard a foot or two long would have seemed insignificant, but now in the midst of the *Age of Mammals,* with a vanishing reptile fauna, we think a two-foot chuckwalla a remarkable lizard. In fact, it is one of the largest, or longest, of the true lizards of the United States, though farther south in Mexico and Central America the closely related Iguanas reach a much larger size. In reality, a two-foot chuckwalla is something of a record breaker, as more commonly they are only a foot or a foot and a half in length. They have been reported weighing two and a half pounds, but that is a full pound heavier than any I have ever seen.

In appearance they resemble rather closely some of the restorations of ancient saurian types, being heavily built, with thick tails, and loose, wrinkled, scaly skins, wide bellies, and narrow heads. Generally they are plain colored, mostly black, as the name *Sauromalus ater* would imply, but some are varied with buffy backs and brown bellies, or with reddish brown sides and tails. The younger individuals are largely reddish brown with four or five broad, dusky bands

OBLIGINGLY POSING FOR THE CAMERA
Sunning on a rock in the desert and the rock is likely to be so hot you wouldn't care to touch it

In a recent article in Nature Magazine Arthur Newton Pack writes of a chuckwalla feast provided by Vernon Bailey at the bottom of the Grand Canyon. We asked Mr. Bailey, one of the distinguished members of our Scientific Consulting Board, to tell us more about this interesting lizard. Here is the story, from which we gather that, from a gustatory point of view, Mr. Bailey and Mr. Pack differ

CHUCKWALLA IDEA OF A PLAYGROUND
The terrible thorns of the barrel cactus mean nothing to them with their tough coats of fine scales

around the tail. Apparently the older they are the more black they get, and some of the largest are mainly black or slaty gray. While basking on the sunny slopes of desert rocks they generally look black, and in some cases are conspicuous at a considerable distance. Often, however, their colors harmonize with dark-colored rocks and are highly protective. In such places they are generally most common.

Chuckwallas live in the hottest deserts of the southwestern United States, western Arizona, southern Nevada and Utah, southeastern California, and extend into western Mexico. In the Colorado Desert the Chuckwalla Mountains are named for them. They are found only where rocks afford cover and protection, and hot slopes are available for daily sun baths. In fact, they get no other baths, and rarely, if ever, anything to drink but sunshine.

They may look fierce, but in reality they are the most harmless, timid, and defenseless creatures imaginable. Their short teeth are useful only for chewing, and they never try to bite, however roughly they are handled or how much they are teased. Sometimes they make a few rapid strokes with their short heavy tails, but this a mere bluff that would frighten only a small foe. They have no venom, and it would be useless for them to try to defend themselves, so they just keep on the rocks where they can quickly slip into some narrow crack, or between two rocks where no larger animal can go, then they puff up their big bellies so no one can pull them out without the greatest difficulty.

THIS ONE IS A SMALL CHUCKWALLA
They are commonly a foot or a foot and one half long and one weighing a pound and one half is heavy

They have need of all their safe retreats, too, for they are good to eat and much sought for by prowling coyotes and foxes and soaring hawks and eagles, as well as by the desert-dwelling Indians. No wonder they are shy and most wary and cautious while so many enemies are ever watching for them.

Under their tough, loose skins their flesh is white and tender, much better to eat

than alligator, and more like frog's legs—a great delicacy in the opinion of the desert Indians and the few white men who have dared to try it. This quality easily accounts for their rarity over most of their range, and in only a few remote corners of the desert are they at all common.

There is every reason why they should be good food, for they live mostly on flowers, with buds and green leaves to fill in when there are not enough flowers to be reached. The flowers and buds are picked from a great variety of bushes and plants and swallowed whole, or chewed so little that they are readily identified in the capacious stomachs. Among them we find flowers of several composites, bean bushes, mallows, the creosote bush, euphorbia, the joint-fir, and the leaves of still other bushes. A thorough examination of the stomach contents of museum specimens would give a much longer list but so far only flowers and leaves have been found in their diet of native foods. In captivity they are fond of dandelions, wild lettuce, and other flowers, especially those yellow or pink in color. Like most lizards they lay eggs, from six to a dozen at a time, but little is known as to how or where the young are hatched, or the way the young get their start in life.

Chuckwallas are gentle and easily handled, and make interesting pets if captured and kept in comfortable quarters with a satisfactory food supply. We know too little of the habits of even our common wild neighbors, and these dwellers in the desert could teach us many things that we do not understand. For instance, if we could eliminate the waste of our bodies by means of dry uric acid instead of by drinking quantities of water it would be very convenient at times, and we might go for months without drinking water. Apparently none of the cold-blooded reptiles suffer from the heat, and many thrive in the hottest parts of our low desert valleys, basking on rocks so hot that one can hardly bear to touch them with the naked hand.

Death Valley, Imperial Valley, and the Colorado River Valleys—the lowest and hottest deserts in this country—are the center of abundance of the chuckwalla. The rocky walls of the canyons along the lower Colorado River, and even up through the Grand Canyon, are favorite haunts, and afford inaccessible slopes, and endless cliffs, and stretches of rocky talus where they can always remain as an interesting feature of the desert even should they be needlessly destroyed from the open and accessible country along the roads and trails.

Like much of the desert life, the chuckwalla cannot withstand the pressure of our common type of civilization that ignorantly and often viciously pushes aside whatever it does not want or does not understand the value of. To those who do appreciate the many interests and charms of the desert life, the varied and often brilliant reptile fauna presents one of the richest fields for study.

GETTING THE GOAT—IN WOOD

A Freak of Coloration

His royal nibs, the mountain goat, had his portrait painted, complete even to chin-whiskers, eyes, teeth and all on a piece of maple board. The artist was Nature, who cleverly discolored the board around a cluster of knots to produce the natural effect. Evidently Nature was a little puzzled as to where to put the ears, and placed them too far aft, but otherwise the freak is a very presentable animal study. The board was found in the carpenter shop of the Forest Products Laboratory of the U. S. Forest Service at Madison, Wisconsin. The teeth and the high light in the eye were produced by reflections from the photographer's arc light.

THE OLD LEADER PLIES HIS TRADE
"Wheezie" even held up motorists on the road when business was slack around the garbage cans

PARK PANHANDLERS

YELLOWSTONE KNOWS THEIR RAIDS

BY JOSEPH JOFFRE

While you are reading this little story by Mr. Joffre, assistant to the Superintendent of Yellowstone National Park, one of the Nature Magazine parties is meeting these Park dwellers in person. Other parties will meet wild friends in Glacier Park and the Southwest during August.

THOUGH once a male was the leader of the panhandlers in Yellowstone National Park, a member of the opposite sex has now assumed the rôle and is plying her trade with considerable success. For years "Wheezie", a large buck deer, led the way 'round to the kitchen doors of the residents at park headquarters begging for handouts and on account of his success usually had a following of bucks, does and fawns. "Wheezie" passed on to the animal heaven last spring and now the procession is headed by an old doe, known as "Molly".

STEPHEN T. MATHER "SPOILING" THEM
The late park director, with Marion and Robert, children of present director Horace Albright, feeds a couple of young panhandlers

At all meal hours Molly, with her two offspring, "Sammy" and "Baby", makes the rounds from one house to another. Her appearance is usually heralded by her rubbing her nose against the glass of the kitchen door, shaking the knob or pawing the door. Her arrival is the sign for the occupant of the house to get into the bread can or cracker box and give her a "hand-out". And not one piece of bread or one cracker will suffice, for she usually has her following and all must be fed. The people at Mammoth Hot Springs have learned to look forward to the coming of this procession and all left-overs are saved. One person has placed a box on the side of her porch, just high enough for the deer to reach, and in it are placed scraps of all kinds—potato, apple, orange and grapefruit peels, cabbage leaves, celery tops, stale bread, cakes and cookies,—in fact, almost everything but meat, for Molly and her tribe have not as yet abandoned the vegetarian diet, although "Wheezie" was known even to "clean up" on this dish. A party or dinner at one of the homes signifies a banquet for the deer family and they seem to sense when something is going on, for all tracks lead to the back door.

The worst offence of the panhandlers is their habit of keeping irregular hours. A noise may be heard on the back porch any hour of the night, but so long as the family is awake it is fairly certain that food will be forthcoming. "Sammy" and "Baby" have become so adept at the trade that occasionally they will stray away from their mother and "make the rounds" alone, expecting larger portions—and getting them—than if they traveled with the gang. Truly they are wise deer.

"MOLLY" AND HER RAIDING BABIES
"Sammy" and "Baby" are branching out as experts after their mother, queen of raiders, taught them how

PROBING the GLACIER'S SECRETS

PECULIARITIES OF THE RIVERS OF ICE

BY CHARLES FITZHUGH TALMAN

NATIONAL PARK SERVICE

NISQUALLY GLACIER, MOUNT RAINIER

The middle of the glacier moves faster than its borders, which become strongly crevassed

Perhaps no writer living has given all kinds of weather as great a charm as Charles Fitzhugh Talman, who once more appears in the pages of Nature Magazine. Weather is his hobby and his work, and when he is not acting as librarian of the U. S. Weather Bureau, he generally may be found delving in the literatures of all languages for words and expressions relating to weather, climate and atmosphere, to trace their history. Mr. Talman writes on a wide range of scientific and industrial topics for leading magazines in the United States, and is the author of a book on meteorology entitled "Our Weather." He is the foremost authority in the world on questions of meteorological terminology and nomenclature. Nature Magazine readers will continue to have the opportunity to enjoy his articles.

THE FARMER who tills the rich soil of glacial "drift" in the upper Mississippi Valley or his brother of New England who fences his land with glacier-borne boulders dug from the ground to clear a way for the plough may have no notion of the geological story back of his local landscape. Yet it is safe to say that he has at least heard of the Glacial Period, and knows in a general way that vast glaciers once covered the earth where none exists today. That the glaciers of the world have undergone great changes in ages past is one of the most familiar of scientific facts. That these changes imply far-reaching changes of climate is a conclusion that anybody may draw for himself.

A fact of much less common knowledge is that glaciers are right now undergoing remarkable changes. These changes are probably quite as great in proportion to the time they occupy as any that have occurred since the world began, and, like those of the remote past, indicate fluctuations of climate; or, if you prefer, of weather. I confess I do not know just where weather ends and climate begins—but neither does anybody else.

A glacier is a sort of meteorological instrument. It registers the vicissitudes of the atmosphere, but it is crude in its operation and its records are hard to read because they jumble together the effects of several meteorological elements. A glacier is fed mainly by snow and it thus serves as a snow-gauge. It is depleted by melting and evaporation; and these processes register the effects of air temperature, the intensity of sunshine and "evaporativity." All the conditions named, together with some others of minor importance, are measured by a single process of expansion and contraction, like that of the mercury in a thermometer.

In the case of the ordinary mountain glacier, which creeps down a slope from fields of perpetual snow to the warmer plains below, the most conspicuous effect of its varying size is the advance and retreat of the lower end, known as the "front" or "snout." The position of the front tends to oscillate back and forth each year, in response to the annual variation of temperature, but these annual movements are, in most glaciers, temporary incidents in more general movements that may take place for years in one direction.

The variations of glaciers are now under observation in nearly all accessible regions of the world, but they have been observed longest in the Alps. During the

nineteenth century the Alpine glaciers had two periods of marked advance, culminating about 1820 and 1855. In 1856 a general retreat began from Savoy to the Tyrol, and this soon extended to the rest of the Alpine region. From 1875 to 1898 there was a less uniform advance, beginning in the western Alps and working eastward. At other times there has been no general movement in either direction, though the movements of the individual glaciers were no less marked. Thus in 1913 of one hundred glaciers in the Swiss Alps, thirty-three were advancing, eight were stationary, and fifty-nine were in retreat. In 1927, twenty-two were advancing, seven were stationary and seventy-one were retreating.

The changing sizes of glaciers are of practical as well as scientific importance, and hence for many years past elaborate measurements have been made of them, partly under government auspices. There is an International Glacier Commission, founded in 1894, which collects such measurements from all countries and publishes them every year. The Swiss government is especially interested in watching the variations of glaciers, because they affect the flow of the mountain streams upon which Switzerland depends for generating electricity. Systematic observations of glaciers are also valuable as a means of anticipating disastrous avalanches and floods.

While the front of a glacier may move either forward or back, the ice in the glacier moves constantly in one direction. There are some glaciers in the polar regions and elsewhere—including the great "ice caps" of Greenland and Antarctica—whose movements have nothing to do with slope, but in most glaciers the ice travels downhill. It is pulled down by gravity and it is also pulled and pushed by other forces, the exact nature and relations of which have been the subject of much controversy.

These movements have been under investigation for about a century. In the year of 1827 the Swiss Professor Hugi improvised a rude shelter under a big block of granite on the medial moraine, or strip of rocky débris, running down the middle of the Unteraar Glacier, in the Bernese Oberland, at an altitude of about 10,000 feet. In subsequent years he revisited this retreat and noted its successive positions, as it crept slowly downward with the general movement of the ice beneath it. By the year 1836 it had traveled 2,200 feet. In 1839 Louis Agassiz found the granite block and the remains of Hugi's shelter 4,400 feet from their original location.

In the year 1840 Agassiz and several companions built a similar shelter a little farther up the moraine and bivouacked for some time in this rude abode, which they jokingly named the "Hôtel des Neuchâtelois." The movements of this landmark were likewise kept under observation for a few years. After a long period of oblivion a fragment of the "Hôtel" was discovered by a tourist in the year 1884. Since that time several more fragments of Agassiz's shelter have been located, and the block under which Hugi built his refuge has been found near them, still almost intact. These relics are now visited every summer, and their positions are carefully determined from year to year. The measurements show that Hugi's block has traveled nearly three miles in the course of a century.

The first scientific measurements of glacier movements, made with accurate surveying instruments and other suitable equipment, were undertaken independently in 1841 by Agassiz and Professor J. D. Forbes. These investigators adopted the plan, which afterward became common, of boring a row of holes in a straight line across the glacier and driving an upright post firmly into

F. W. SCHMOE

WHERE MT. RAINIER'S PARADISE RIVER BEGINS

Fed by melted ice, it has carved a channel under the glacier, and now reaches daylight

U.S. BUREAU OF PUBLIC ROADS

SOURCE OF THE RIVER RHÔNE

It starts from the Rhône Glacier, Switzerland, which until the middle of the nineteenth century covered half the valley in the foreground

each hole. The movements of the posts from their original positions were carefully measured by means of a theodolite. Agassiz set up a line of six posts across the Unteraar Glacier, and a year later he found that their movements, stated in order from one side to the other, were respectively one hundred and sixty, two hundred and twenty-five, two hundred and sixty-nine, two hundred and forty-five, two hundred and ten, and one hundred and twenty-five feet.

It will be seen from these figures that the center of the glacier moved much more rapidly than the sides, and this was subsequently found to be the universal rule. It is the strains due to these differences in the rate of movement that cause a glacier to be strongly crevassed along its borders. Later studies showed that the ice travels faster at the surface than in the depths of the glacier, and also that there is a marked slowing down of surface movement as the lower end of the glacier is approached.

The tip of the hour-hand of a man's watch travels about an inch in three hours, or eight inches a day. This is approximately the average speed of movement found for the ice of the Swiss glaciers, the averages for individual glaciers ranging from 100 to 500 feet a year. In some regions glaciers move much faster. One large glacier in northern Greenland has been estimated to move 100 feet a day, but this speed is altogether exceptional.

In connection with Professor Forbes' studies of glacier movements a remarkable incident happened. In the summer of 1820 a party of mountaineers, including eight guides, attempted an ascent of Mont Blanc. When near the top they were caught in an avalanche and three of the guides were swept into a deep crevasse, where they were buried beyond recovery. In 1858 Forbes predicted, on the basis of measurements he had made of glacier movements, that the bodies

P. L. MERCANTON

MEASURING A YEAR'S SNOWFALL

A Mougin "totalizer" in the Alps. A salt solution melts the snow and a layer of oil prevents evaporation

SWISS FEDERAL RAILROADS

AN ALPINE RIVER OF ICE

The Gorner Glacier, above Zermatt, with the Riffelhorn, Monte Rose and the Lyskamm in the background

of these unfortunates would reappear in about forty years from the date of the accident at a certain point lower down. In 1861, only a year after the predicted date, the heads of the men began to emerge from the wall of a crevasse near the place indicated, which was more than 9,000 feet below the scene of the disaster. In the course of the next four years their bodies were entirely uncovered.

One of the things upon which the speed of glacier movement depends is the thickness of ice. In the case of the Rhône Glacier, for example, it has been found that an increase of 1 meter in the level of the ice causes an increase of two meters a year in the rate of movement. According to the late Professor Forel, the faster a glacier travels the farther its front will be extended. If a glacier is thicker than usual, it will travel faster than usual and its front will advance. A single hot summer will not generally diminish the thickness of the whole glacier below the average and thus will not slacken its speed enough to permit a retreat. A series of hot summers, however, will eventually shrink the glacier below its average size and a retreat will set in. Thus in performing the function of a thermometer a glacier indicates the trend of temperature over a period of some years, rather than the conditions of a single year.

The glacier is also a sluggish recorder of snowfall. When an excessive amount of snow falls over the collecting area at the top of the glacier there is no prompt increase in the thickness of the ice farther down the slope. The excess of material appears to be carried down very slowly in a sort of wave, and when this reaches the front there is an abrupt advance.

At the Glacier des Bossons, on Mont Blanc, we learn from a series of monthly measurements that the glacier does not advance uniformly along the front, but with a wadd-

P. L. MERCANTON

HOW FAST DOES THE ICE TRAVEL?

These observers on the Unteraar Glacier are locating with a theodolite stakes set in the ice to determine the ice flow

ling motion; sometimes one side, sometimes the other and sometimes the middle moves most during the month. This glacier advances most rapidly in spring, about half as fast in summer and winter, and very slightly in autumn. All these facts show that the relations between climatic variations and the length of glaciers are extremely complex. There is no doubt, however, that glaciers show a very striking response to climatic influences. Its magnitude is best brought out by figures showing changes in the bulk of a glacier rather than its length. Such figures have been published by the French government for some of the glaciers on the Savoy side of Mont Blanc. Here it was found that between the years 1912 and 1920 the Glacier de Trélatête gained no less than 22,000,000 cubic yards of ice.

A stupendous amount of labor has been expended in the quest for "cycles" or definite periods in the variations of climate, and the records of glaciers have been much used in this connection. Though, for the reasons we have stated, these records are hard to interpret they are believed by some authorities to confirm the existence of a cycle averaging 35 years—the celebrated Brückner Period—in both temperature and rainfall, evidence of which is also thought to be found in records of water stages in lakes and inland seas, the thickness of the annual rings of trees, the prices of grain from year to year, and so on.

Many ingenious methods have been devised in recent years for probing the secrets of glaciers. In order to obtain some idea of the total volume of ice in a glacier, its depth must be measured at many points. This has generally been done by drilling holes down to the rocky bed, but the process is slow and laborious and it involves the transportation of heavy tools over the rough surface of the ice. A new and promising substitute for this process is to utilize some of the acoustic methods of sounding that have been so successful in the measurement of ocean depths. One plan is to set off explosives and observe their echoes—after the sound wave has traveled down to the bed of the glacier and back to the surface—with the aid of a geophone. Experiments have also been made on glaciers with the "ultra-sonic" depth-finder of Professor Langevin, which sends out an acoustic signal of very high pitch (far beyond the range of audibility) and records the echo mechanically.

An instrument called the "cryocinemeter," attached to the front of a glacier, provides a rapid means of measuring its movements of advance and retreat. Measurements of the snowfall on the surface of the glacier and its surrounding basin are made by means of snow-gauges called "totalizers," which catch and preserve the snowfall of an entire year. Variations in the depth of the snow cover are measured by means of graduated stakes set up at various points and by cutting vertical sections through the snow with "snow-samplers," such as are used in snow surveys in the western United States. The flow of water in the interior of glaciers is measured by placing coloring material at different places on the icy slope and watching for its appearance in the torrent that issues from the glacier front. The aeroplane has lately become important in surveys.

The student of glaciers has his thrilling experiences, comparable to those of the volcanologist. One summer, not long ago, a Swiss party was making surveys on the Diableret, when one of the number missed his footing, the rope attaching him to the others broke, and he was pitched to the bottom of a crevasse 175 feet deep, but fortunately was not badly hurt. It was twelve hours before he could be extricated—and he spent the waiting time making measurements of the crevasse.

SUMMER THIRST

BY HELENA LINDSEY

PHOTOGRAPH BY THE AUTHOR

Some sections of California are almost birdless during the hot summer months because of the shortage of water. When the running rills of early spring dry up and the hillsides become dry and brown, the little feathered folk fly away to the canyons and mountains where there are living springs.

One bird-loving woman, living at Granite Station, Kern County, has greatly reduced this summer migration from her immediate locality by securely placing cans on the top of the fence posts surrounding her place. Once or twice a day she makes the round with water bucket and dipper, filling each can to the brim. The result of this little experiment has been most happy. She has many guests.

One hot morning I sat on her porch counting, in one hour, more than twenty birds—Lawrence and green-back goldfinches, house finches, gray tit-mice, valley quail, a downy woodpecker, a red-shafted flicker, and a fussy little rock wren—who came to drink at the fountain on top of the front gate post.

These little oases are patronized by the feathered public all day; and during the early morning and evening hours there is a continual whirr and flash of wings.

WOOLLY APHIS ON A MAPLE LEAF

The fuzz protects the pests from the sun and from their enemies while they feed

LITTLE PEOPLE OF THE GREEN THINGS

BY A. B. CHAMPLAIN
AND T. L. GUYTON

PENNSYLVANIA DEPARTMENT OF AGRICULTURE

PHOTOGRAPHS BY H. B. KIRK

Here is some intimate information on the prolific little pests that all who are gardeners know too well. If you need any advice on how best to battle with them just let us know your problem.

TWIG GALLS ON HICKORY

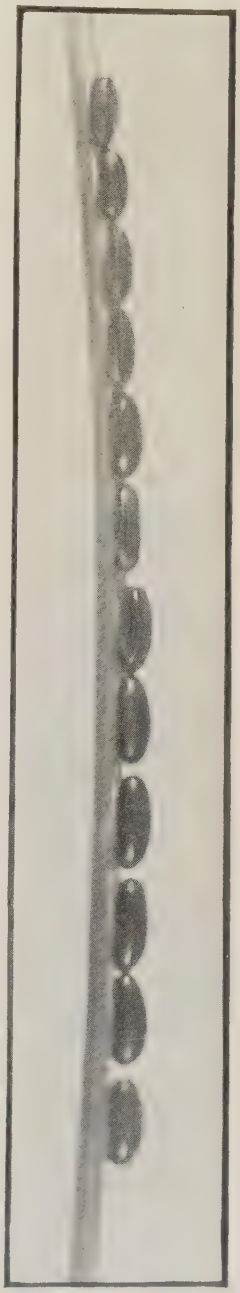
The aphids are responsiblo for this depredation

No one could possibly have imagination enough to invent a story so wonderfully peculiar as that of the little people of the green things, who persist in spite of the constant warfare waged against them by man and beast. We may find miniature mystery and insect tragedy, possibly bug romance and, surely, startling facts. Let us, then, consider the inside story of the private life of plant-lice or aphids.

The facts of this extraordinary case, so much stranger than fiction, are the results of careful observations. But as self-appointed press agents for these timid, voiceless bits of life, may we throw light on a subject hitherto hidden under Latin and Greek nicknames and technical dialect.

Nature has provided a great variety of plants to benefit and ornament this world of "ours." Then, with a grim humor that we cannot appreciate, she furnishes an insect inhabitant for nearly every kind. The plant-lice or aphids are not among the least of these. Farmers, gardeners and flower fanciers are having a hard time keeping down the aphid population of their plants; while the aphids themselves are just as strenuously striving to maintain their position, each thinking that plants were created for their especial benefit. Be this as it may, we can only say that plant-lice or aphids are born to eat and to be eaten.

It cannot be said that these drowsy looking little insects lead a life of continual excitement. On the whole, however, we find that they have many powerful enemies; and are continually being heckled by thieves, robbers and assassins; exploited by



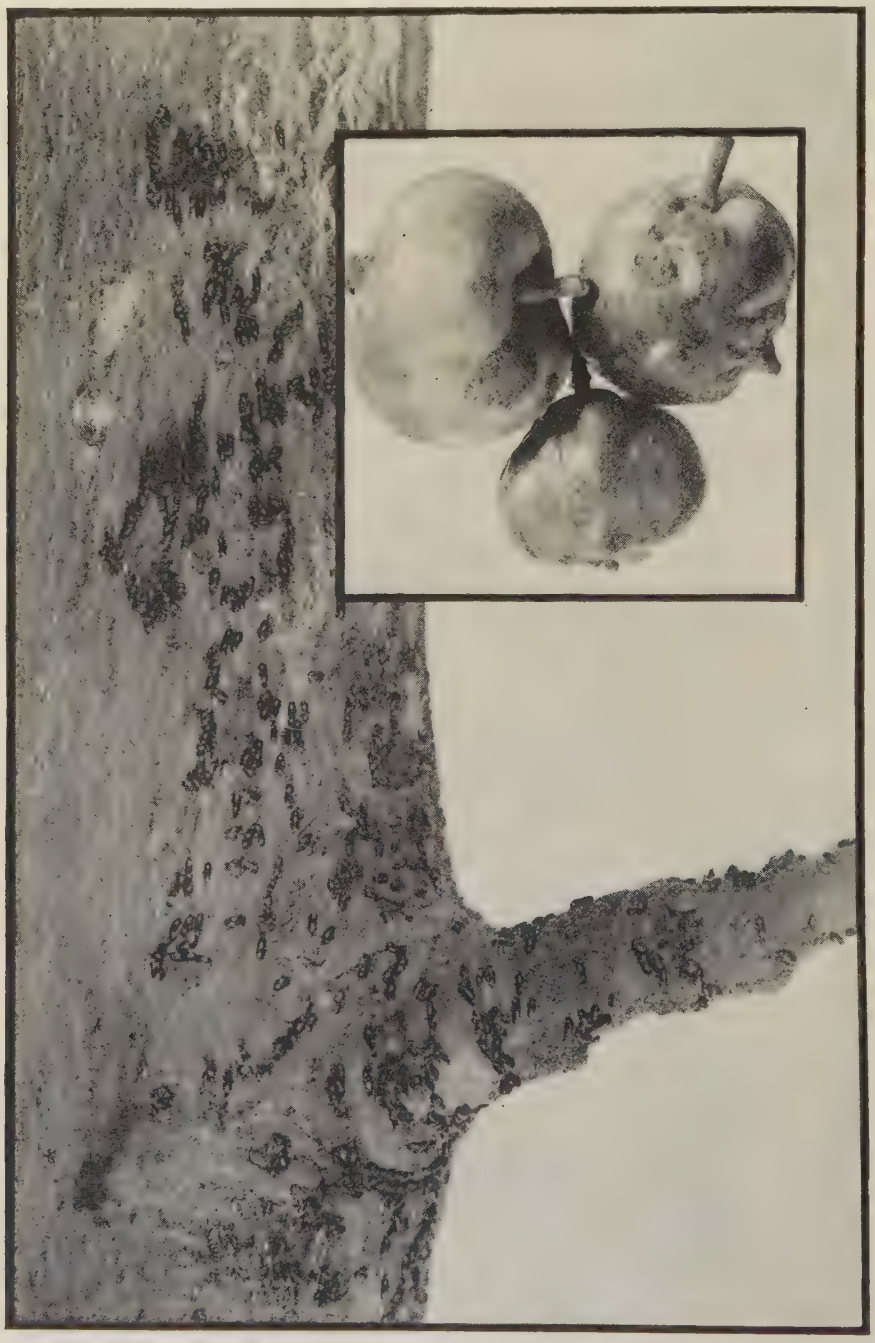
APHID EGGS

Potential destruction on a pine needle

ants, and sprayed or dusted with evil smelling decoctions by humans. Here and there may be one who eats and sleeps away an uneventful lifetime of three or four weeks.

At first glance it would seem almost as though life had neglected to arm or protect these little bugs, they seem so helpless and vulnerable, so soft and "squashy." They have no offensive weapons and no defensive armor, but in spite of all this they continue to make their impressions on the economy of the times.

There is an amazing factor that protects them. These creatures, apparently so deaf, dumb and unsophisticated, are prolific to a degree almost unexcelled. The rapidity of their increase accounts for the vast multitudes that are able to persist. We find plant-lice apparently loafing about over our rose-bushes and chrysanthemums. They over-run our fruit trees, dwarfing the fruit into grotesque, unnatural shapes or curling the leaves in permanent waves. In the garden they reduce the potatoes and other innocent vegetables to a deplorable state of health. Most everywhere you may run across these tiny nuisances huddled together as if for mutual support, their heads close to the plant and their bodies raised awkwardly on six slender legs. It makes no difference to them that the ailing, blighted plants are helpless and at their mercy. Though they may appear to be idling about, they are very busy sucking the life-blood or sap from the plant on which they live. All day long they suck away, plunging their beaks into the helpless plants and filling their tiny plump bodies with plant juice.



APHID EGGS ON THE TRUNK OF AN APPLE TREE

In the inset we have deformed apples showing what happens when the aphids really get to work

The head of the aphis bears a pair of compound eyes of many facets, and, for good measure, usually has three simple eyes or ocelli, in addition. A pair of feelers or antennae adorn the head also. This three-to-six jointed sensory organ or apparatus is attached to the front of the head below the eyes. Then comes the rostrum or beak. This is formed into a slender sort of four-or-five jointed split tube, accompanied by lancets which are used to do the actual piercing. This convenient drill and siphon seems to arise from between the front legs and is an invention that has made the sucking insects notorious. When once they get started at this epicurean amusement they never seem to get tired of it. They take so much juice that after passing through their bodies it oozes out again. This overflow of juice, falling on the stems and leaves of plants or trees, covers them with this sticky, glutinous substance. It is often called honey-dew and is the result of a digestive process within the aphid's body.

Bees, ants, butterflies and flies are very fond of this honey-dew. One often wonders what has attracted a motley crew of insects to a limb, or the foliage of trees; but after careful examination this free lunch of "sweets" may be determined as the cause. Insects may often be observed by the thousands, licking up honey-

dew from the places where it has fallen. Myriads of ants may be seen traversing the trunks of trees on which plant-lice are plentiful. They do not attack or injure the plant-lice or aphids, but take the sweet excretion as it passes from its source. This, and the fact that some aphids or plant-lice are tended and cared for by ants, who thus exploit them to their uses, gives to the aphids the name of "ant's cows."

Most of the aphids made no home for themselves, except to cling with "tooth and nail" to the plant on which they feed. They only move about to find a new spot on the plant in which to drill and suck.

But why are plant-lice able to retain possession of so many of the green things in the world? First we must notice that they have several ways of bringing their young into the world. In late summer among the masses of ordinary winged and wingless aphid population there are some stragglers here and there who deserve special notice. You might be able to locate them if you had a microscope or magnifying glass or were familiar with aphids and the intimacies of their social circles. At any rate, these important individuals are the true males and females, who will be the "fathers" and "mothers" in the stricter sense. Some of them have delicate transparent wings that have grown under their shedding skins; others are wingless and must walk or crawl through their life romances. The true aphid mothers, wonderfully directed by instinct, will lay innumerable eggs on the stems or twigs of the proper host for their progeny. This is accomplished before frost kills off most of the remaining plant-lice. So most of these little bugs must go through the winter by the "egg route." These eggs hatch, the next spring, into plant-lice or aphids. But here is a funny thing. If you look for winged or wingless fathers and egg-laying mothers you will probably be disappointed. You will see only the little, round, fat, soft-bodied forms,—the wingless multitudes. Yet, strange as it may seem, new ones are constantly appearing as time goes on. Where do they come from?

GALLS ON AN ELM LEAF

The next time you see this condition on a leaf you will know that it was caused by aphids

The secret is in parthenogenesis, special and odd way that life has invented for certain little creatures, including the plant-lice, to multiply. To be born without a father is no disgrace for a plant-louse and here is where parthenogenesis comes in. It is reproduction by direct growth of germs from egg-cells, not fertilized by the male element. A single parent (single meaning one, or unmarried, whichever you choose) after ten or twenty days of feeding and moulting (shedding skins) is mature enough to bear offspring. There come from her body not eggs, but "young ones", little living plant lice or aphids like herself. Perhaps three, or again seven in a day. No maternal care is given to these new arrivals, but they are left to shift for themselves. It is comical to see their antics as they clamber over the backs of the massed multitudes, hunting a clear spot on the plant. Here

TOO MANY APHIDS FOR THIS CABBAGE LEAF

The practised eye would see dead parasitized forms from which a small wasp-like parasite will emerge

they insert their beaks and begin a sucking existence like the others.

Aphids must change their clothes about three or four times. They crawl out of their splitting, sloughing skins in order to grow. Finally, after a few weeks and with no more ado, they too will present the world with a new generation. In this way in a short space of time the whole plant may be covered with these tiny pests. And all from one or two parthenogenetic or budding mothers. In fact it has been recorded that one producing female of the potato aphis was the parent of seventy-two individuals in twelve days, during which time five of her children were producing young. Also it has been estimated that the loss in this country due to the attacks of the spring grain aphis for one year was twelve to fifteen million dollars. Since there are about eight or ten thousand different kinds or species of plant-lice or aphids in the world one can readily see that with their rapid rate of reproduction there is great possibility for damage.

NO NEWS TO ROSE GROWERS

Most of us have seen this and ran for the loaded spray gun

Have you ever picked up a rose bud, beautiful and fragrant, only to find it a green mass of lousy life; or a leaf covered with sticky wax-like tufts of white fuzz or "cotton"? Look carefully and you will find that inside each tuft there is an aphis. The fluffy exudation is a sort of wax which oozes from pores in the body of certain kinds of plant-lice. This secretion, which gives the name of woolly aphis to its wearers, serves to protect them from the sun and from their enemies as they feed. Some of these fluff-covered aphids attach themselves to the stems of apple trees and have been known to destroy them. Aphids rank among the major insect pests of the apple and many other kinds of fruit trees. Then again there are others which eat their way into the stems or leaves of trees, making leaf-curls, rosy bladders, or other gall formations, in which they feed. Aphids rank high as destroyers of grain crops, truck crops and greenhouse products. Not only is there a loss occasioned by their direct attack and injury to the plant, but the cost of control measures amounts to a large sum each year.

Some kinds or species of plant-lice are confined throughout the season to one species of plant; others to one or two species; others may live on any number of hosts. Their migration habit, from one host to another, adds to the complications. In this respect it has been proved that plant-lice or aphids carry plant-diseases from plant to plant, by their migrations and feeding.

Summarizing, we find that these prolific creatures, propagated by true males and females, give rise to budding mothers, their progeny beget additional parthenogenic females, these raise huge fatherless families of similar incubating plant-lice, until, before we know it, we "humans" might expect to be crowded out of this sweet life by the surplus of aphid occupants. But plant-lice are poor material to fill the world with, so such a calamity has been averted by Nature.

The reason that the aphids or plant-lice haven't destroyed all the green things in the world is because they have powerful enemies. Lurking among the leafy branches or boldly stalking on stem or twig, greedy parasites or insatiable predators are forever preying on the bodies or substance of these helpless ones. Birds delight in these tid-bits of juice-stuffed plant-lice. Beetles devour them, and here we must mention individually the innocent looking lady-birds or lady-beetles, as they are often called. These beetles, both young and old (first as leaden colored, six-legged grubs; then as turtle-shaped, red-coated, spotted adults) love nothing better than to stuff their "tummies" with tender plant-louse steaks and chops. Lady-beetles may be observed wherever the aphids abound, attacking them with sharp jaws and eager appetites.

Numerous other predacious insects, such as the lace-winged flies, attack them, while the little winged parasites are ever on their trail. Little wasp-like creatures lay their eggs on or in the bodies of living plant-lice. These eggs hatch into tiny grubs that feast and grow to maturity within the body of their doomed host. These internal parasites constitute one of the greatest factors in the natural control of plant-lice.

Even the slow moving grubs of the flower flies, Syrphidae, slink about among the helpless aphid masses, seizing victims in their greedy search for honied blood. After sucking the body juices of their helpless prey and dropping empty skins by the hundreds, they pass on their way to finally become beautiful, golden-banded flies.

Of course we cannot stop here to speak of every plant-louse and all its relations. No general summary can be made that will properly cover (Continued on page 130)

OUT A'FISHING

WITH LEW SARETT

BY MAURICE FRINK

JUST A'WHITTLIN'

Lew Sarett—lecturer, Nature poet, conservation leader—had rather be out in the woods than anywhere in the world

Yes, that adventure was a great success. There are days and days, but if a fairy—all fishermen believe in fairies, just as all fishermen believe that the big ones will bite just around the next bend—if a fairy should ever ask me which one of my days outdoors I'd like to live over again, I should reply without needing any time to decide, "That day on Otter Creek with Lew Sarett."

I had known him a long time; our trails had crossed at various places. I knew the poetry of the woods and mountains in his three books—*Many, Many Moons, The Box of God,* and *Slow Smoke.* I had felt him stir me as a lecturer on Nature; he had wakened me to many things, as he no doubt has thousands of others who have heard him. And that day in Forest County, where he has his home on the edge of the little Wisconsin lumber town of Laona, I saw at close quarters that side of the man which will appeal to every lover of the out-of-doors.

We had set our hearts on fishing, and Lew led me to a pond through miles of dense forest, over what he said was a trail, though I never did understand how he knew there was a pathway at all. And we had not gone half a mile along this unblazed trail I couldn't even see, before I discovered he was an expert woodsman—the kind one seldom finds, even in the forests.

The red-shirted figure ahead of me stopped suddenly as we topped a rise. Lew scratched his head.

"That's funny," he said.

I too studied the ground at which he was looking perplexed. But I saw nothing "funny."

"The pine needles," Lew explained.

Yes, yes, thought I; pine needles, sure enough. What of it?

"Why, where did they come from? And how did they get here?" asked Lew. "There's not a pine tree within sight. All the coniferous trees you can see from here are tamarack, balsam, spruce, or hemlock. Yet the ground is covered with white pine needles."

He finally decided that early in the spring (he could tell that from the extent to which the pine needles had dried) a terrific windstorm had come out of the northwest and had stripped some of the needles from a grove of white pine that lay northwest of us a quarter of a mile.

As we jogged on through the woods, toward the spring-pond where the rafts awaited, I wondered what I had learned from my life in the cities, commensurate with the satisfaction there must be in living so long in the open that you can detect misplaced pine needles on a forest floor.

And soon I saw

WHERE BEAUTY—AND FISH—DWELL

Lazily they cast their flies, joyous at being part of the wilderness

another bit of woodsmanship. For nearly an hour we had made our way through the forest, with an occasional stop to sprawl on the moss at the base of some giant tree to smoke a few puffs from our pipes; or to study this clump of Indian pipes or jewel-weeds; or inspect this fungus or that leaf-borer. The trees were dense around us. The terrain became more rolling and rough, and presently a tiny lake, almost hidden by the two-hundred-year-old hemlock trees, gleamed up at us from a hollow to one side of the trail.

Suddenly Sarett "froze" in the trail ahead of me. I too stopped, straining to discover what new mystery he saw.

"There's something alive down there. It sounds like fish, but I didn't think there were any trout in that lake. We'll wait a minute and see."

He squatted on the ground. We both watched the surface of the deep blue water, through the trees. The distance to the lake was the equivalent of about two city blocks.

I have scored a 97 in five shots with a pistol so you may know my eyes are not so bad. But if my life had depended on it, I could not truthfully have said that I saw or heard any sign of life on the surface of the lake. Yet the woodsman heard something and saw something.

Lew stood up.

"See it—that little ripple on the surface of the lake?" he said. "Let's go close and find out what it is."

He led the way at a fast clip down the hemlock-wooded hillside, through brush and thicket. With some reluctance I followed. We still had much to do before our day ended, and it seemed useless to me to chase down that hill after something that wasn't there.

A few rods from the lake shore Lew paused; then he told me to wait where I was. He disappeared through the thick timber and underbrush that rimmed the lake. I sat down and was resting comfortably when I heard him shout:

"Come on! Quick! Otters—four of them—five—six! Come fast or you won't see them!"

I went, fast, and I did see them. Crashing through the bushes, sprawling over fallen trees and struggling across a stretch of bog, I finally found footing beside Lew, on a bit of shaking muskeg at the very edge of the lake. He whispered: "Don't move! Right under us."

As I looked down, a baby otter, so new to the world that it lacked the sense to fear us, swam past our feet, skirted the shore, and finally disappeared under the roots of a cedar. Then I was aware of a commotion out in the water.

There, a rod from us, the mother otter lifted her dripping head, champed her teeth at us frantically, and dived. She came up again, and again she dived, swimming back and forth in front of us, reversing under the water, and at each reappearance baring her fangs in an ugly snort. Her brood, Lew said, had scattered, and all but the little one I saw had disappeared before I reached the lakeside.

"But how could you tell they were here," I asked, when we were way up there on the hill among the trees?

"Why, I don't know," said Lew. "I just knew something alive was down there—maybe beavers, maybe minks or otters—I didn't know for certain it was an otter family!"

Not long after that we reached the pond, a beautiful acre-large pool of deep green springwater rimmed by spruces reflected on the mirror-like surface; and we went to fishing. Lew worked out his line fifty, sixty, seventy feet. I saw him drop the tiny feathers on the edge of the pool as lightly as moths fluttering down. After a bit I saw the silver bend of his rod, as he set the hook, and I saw the flash and spray of water as he worked his fish in to the net.

I poled my raft out from shore, and struggled to keep on top of the water. I watched the reflection of the trees. I watched the clouds idling over, and their shadows drifting through the pond. I watched the man on the other raft. I had the time of my life.

After a while it was noon, and Lew called to me to pole to shore, to go "right over here to a spring, and eat."

"Right over here" proved to be half a mile away through the cedar swamp. We sat on logs, and ate sandwiches, and drank from the spring. Then Sarett burned the paper that had been wrapped around our lunch, and drenched the ashes with water.

I mentioned, as we sat there, the fact that I was doing some writing that was particularly difficult.

"How glorious," came the unexpected response. "That's what makes life worth while, isn't it? All writing, all living, is a struggle; but Lord! without it there'd be no zest in living, or in doing anything,—no accomplishment, no triumph. Half the joy of life lies in breaking the things that are trying to break you. Myself,

HANG ME AMONG YOUR WINDS

BY LEW SARETT

Reproduced from "Slow Smoke" by courtesy of the author and Henry Holt and Company

Hang me among your winds, O God,
  Above the tremulous stars,
Like a harp of quivering silver strings,
  Showering, as it swings,
    Its tuneful bars
  Of eerie music on the earth.

  Play over me, God,
  Your cosmic melodies:
The gusty overture for Spring's
Caprice and wayward April's mirth;
  The sensuous serenade
Of summer, languid in the alder glade;
  The wistful symphonies
Of Autumn; and Winter's rhapsodies
  Among the drifted dunes—
Her lullabies and her torrential tunes
Moody with wild cadenzas, with fitful stress
  And poignant soundlessness.

Touch me, O God, with but a gesture—
  And let each finger sweep
Over my strings until they leap
  With life, and rain
Their silver chimes upon the plain
In harmonies of far celestial spaces,
  Of high and holy places.

I get so battered at times, so weary, I hunger so at times for a trout stream, and solitude, with a life that contains no bleeding, no fighting, that I feel like chucking over everything and just living the life I long for. But I don't —a man can't! He's got to keep fighting for something."

Ever since he left Evanston, Illinois, and moved his home and his family to the little Wisconsin town, Sarett has kept contact with the whirl of things. He teaches three months each year at Northwestern University, and he spends a few weeks each winter lecturing on wild life. Most of his time at Laona he gives to writing. A fourth book of woods poetry will come from his hands some of these days, when he has shaped and reshaped it into the form that he is satisfied is the best he can give it. Not until then will he release it.

"I don't ask much," he told me. "About all I really want to do is to write something that may live, something that captures the beauty and power of our American woods and mountains and of their folk, wild and human. I'd like to do that much for the country that has done so much for me; I'd like to pay back, in that way, something of the richness of life that I have found in the woods and mountains and by the streams and lakes of America. I like to hope it is a debt I can pay."

NEAR THE OTTER'S HOME

By a spot like this the mother flung defiance at the humans who had come upon the family party

He is doing that in a different way, too, for he has found in Wisconsin another one of the battles that, for him, make living worth while. He is fighting constantly for the conservation of our national resources, and for forest protection and maintenance. He is active in organizations that aim to preserve our American wilderness in national parks, for several years as a U. S. ranger in Yellowstone and in Glacier Parks have given him a familiarity with National Park problems. He is connected with movements to hold intact from private exploitation the tremendous water power latent in Wisconsin's thundering rapids and waterfalls, to curtail large bag-limits for game and fish, to establish a closed season on all bear, grizzlies as well as black bears, to propagate, on an extensive scale, trout in rearing ponds, and to win for the U. S. Bureau of Fisheries adequate support and interest. To these and a dozen similar activities connected with the perpetuation of our wild life he gives a large portion of his time and energy.

While we drank of the pure crystal at the spring and munched our sandwiches, I asked him what was the secret of his woodsmanship, and of the woodcraft of other men who are gifted with insight to the comings and goings of creatures of the woods; how it is that a man can know so unerringly what went on in the forest yesterday, today, or a month ago.

"Well, it's simple in a way," he said, "this business of reading the soil. There are three factors in it.

"First, you've got to have senses that are alive; you need a keen sense of sight, of smell, of hearing. Living much in the woods develops that considerably. Nature does that for human beings, just as it sharpens the senses of the deer and the timber wolves that roam these forests.

"Second, you need common sense, the ability to reason from effect to cause, or from cause to effect—mostly the former.

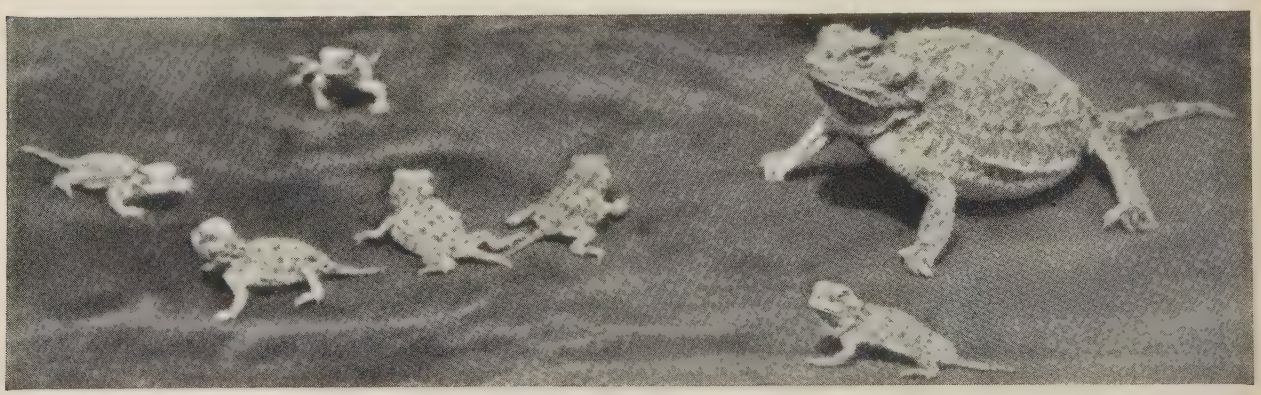
"Third, and perhaps the most important, you need to understand from experience and observation exactly how trees, grass, ferns, lichens, water, stones, animal tracks—how the whole world of Nature looks when it is natural, undisturbed. Knowing that, when you see any little thing out of place, something that 'doesn't belong'—a pine needle in a maple grove, a streamline ripple of water on

a pool when there is no wind, a broken twig, the spread hoof-print of running deer, a scratch on a log —when you see or smell or hear anything unnatural in the woods, you can tell at once what has occurred or is to occur.

"It's all simple—if you know how the world of Nature looks when it's natural. That's a mighty big world to know in all its detail! But it is, to many of us blown-in-the-bottle lovers of the woods, the most interesting and most beautiful world in the universe."

Of these and many other things we talked as we sat on the logs and ate our lunch. We talked of the distant cities, and of the rush and hurry and turmoil of life there. We wondered why more men, harried by their tasks and duties at desks and counters, do not seek the healing comfort of the wilderness. We felt the pine-breath in our lungs, the woodsy breezes cooled our faces. We lived for those few hours as men were meant to live.

Later we fished some more, and then we hiked out through the forest again to our car, and drove back in the evening, he to his home, I to my camp. And I suppose this story wouldn't be complete without my answering the question that comes sooner or later after every such trip. Yes, we caught some trout; that is, Lew did. But the fish were really the least important part of that day. And the really worth-while things I have tried to tell you.



THE MOTHER AND HER BROOD
She appears to be very gruff with them, but in reality is fond of the children who so closely resemble her

HORNED TOADS

BY T. H. SCHEFFER

"PIGS IS PIGS", stoutly insisted the local express agent when quoting rates on a shipment of guinea pigs, the little beasts that are neither fowl nor porker. So "Toads is toads", when shaped that way, though the little creatures here have horns and scales, and a tail the like of which our garden toad lost in its tadpole days.

The two larger horned toads in this family group were picked up on the sands of the sage brush country in eastern Washington, where they would have remained unobserved if they had not become fidgety. They are protectively colored and not likely to be seen when resting quietly on a background of their own choosing. However, when we were ready with our own choice of things for the studio sitting a day later, we were somewhat taken aback at finding a group of eight to pose, instead of the two we had taken aboard the train. This the porter evidently did not know, or he would have expected an extra tip for having looked after a whole family in the little box inconspicuously mixed up with our luggage.

Each little horned toad is the spit and image of its immediate progenitors, but it would take an ant's eye view to give it the proportions of the more remote Iguanodons, or some such, that used to rear on their hind legs and tail to browse on the trees. Meanwhile the ant would be gobbled up by the toad, whose tastes run to small insects in general and ants in particular.

The horned toad is quite gentle and inoffensive, often to its own undoing For some tourists there are who appear to seek out in their peregrinations only the post card racks and convenient objects in Nature on which to carve their initials. Such well meaning but thoughtless transients are too prone to buy from obtrusive venders of souvenirs these little creatures of the desert, very useful at home as insect eaters but almost certain to perish from neglect or starvation when removed to unaccustomed surroundings. And the supply is not inexhaustible. Nature does not provide creature things in excess of balanced forces. So let us not waste her products.

AMPHIBIAN AND LAND PLANES THAT SOARED TO SEE ECLIPSE
Machines piloted by Lieutenants Leslie E. Gehres and Warren W. Harvey, U. S. N. which cooperated in observing the eclipse of the sun at Honey Lake, California

IN THE SHADOW OF THE MOON

THE PURSUIT OF THE ECLIPSE OF THE SUN

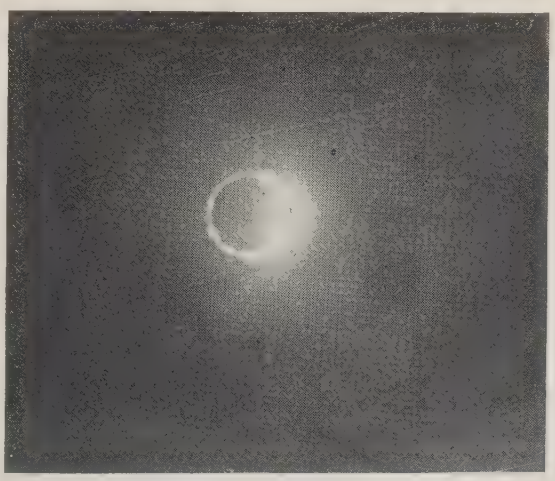
BY ISABEL M. LEWIS

We waited with bated breath. In the high East, the sun fought to break its way through the clouds above us. Would it win free, or would the mists conquer? Our cameras were set; nearby the motors of the Navy pursuit plane ready to hunt the eclipse above the clouds roared rythmically; the crowds tensely pressed forward to gaze through the ground glass of the motion picture machine. A dark shadow bit an arc out of one edge of the sun; it worked deeper and deeper. Now half the sun was gone; the day darkened. The plane took off, to climb 18,000 feet. We made our final preparations, tense and anxious. The second and a half for which we had travelled across a continent was at hand. It struck; the camera shutters clicked; the moving picture camera ground out its feet. And slowly, slowly, as if reluctant to pass from the face of the sun, the shadow receded, and day came back. We were able to breath again. We had witnessed the total eclipse.

No wonder we were worried as we waited. The solar phenomenon of April 28 for which we had travelled from Washington, D. C., to the edge of the Plumas National Forest was of that infrequent type known as central. So nicely were the relative distances of the sun, moon and earth adjusted at the time that the tip of the moon's cone of shadow just barely grazed the surface of the earth in some of the western states. The width of the path of totality in California was less than three-fourths of a mile and the duration of the total phase less than one and a half seconds.

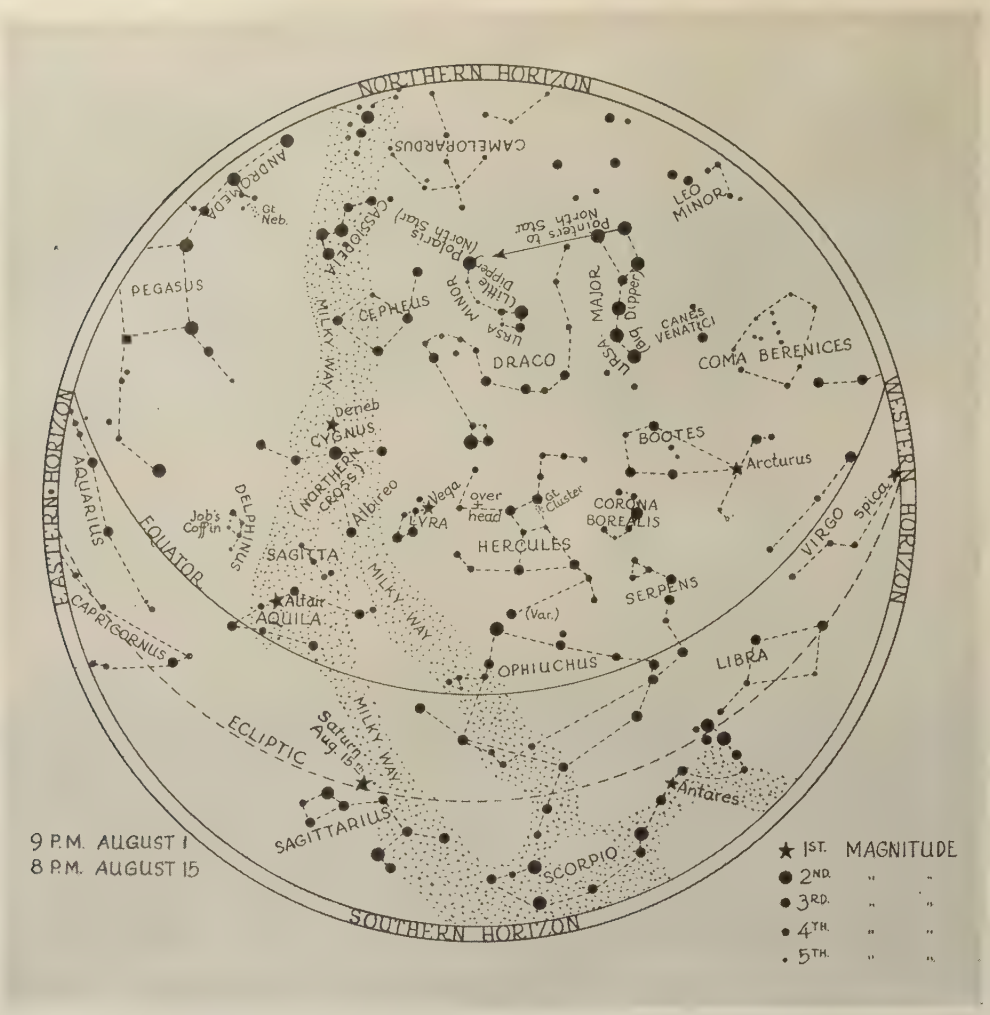
Furthermore, irregularities in the moon's motion might offset the path's position by more than its own width, and we would see not a total phase, but sunlight in the form of Baily's Beads along one mountain and valley-serrated edge of the moon; or, if we were on the central line, the Beads would be all around the moon.

Had we found the correct spot? This thought was uppermost in our minds as we waited. Would it be possible to secure a photograph of the eclipsed sun from our station while the moon's shadow swept along at the velocity of half a mile a second? No longer than six weeks before the event, the path of the eclipse as published in the American Ephemeris for 1930 had been revised by James Robertson, Director of the American Ephemeris and Nautical Almanac, and the new figures sent out to all observatories. Were they correct?



SHOWING THE BAILY'S BEADS
Photograph of the eclipsed sun taken by the author and showing the effect of light shining through lunar valleys

Now that we have returned to the East with still photographs and moving pictures of the total eclipse, unusual because they show the little-seen Baily's Beads, and have proved that Mr. Robertson's figures were correct to the furlong and second, we can perhaps laugh at our qualms that memorable morning. But surely for us few seconds and a half have ever been as



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south

fraught with excitement or ever were preceded with such elaborate preparation.

To get the photographs and test the predictions had been the main purposes of our trip to the shores of Honey Lake, where the boundary of Plumas National Forest meets the main highway from Susanville, California, to Reno, Nevada. Although our expedition was not official, Captain G. S. Freeman, then Superintendent of the U. S. Naval Observatory, had arranged for two Navy planes from the U. S. Naval Air Station at San Diego to meet us two days before the eclipse, equipped with motion picture cameras with which an attempt would be made to photograph both the eclipse and the fleeting shadow of the moon. Due to the extreme narrowness of the path we felt it would be possible to get the entire elliptical shadow of the moon within the field of view of the camera.

For ground pictures, we had brought the lens of 4.6 inches aperture belonging to the Naval Observatory which had been on many an eclipse expedition to distant lands. This we mounted as a telescopic camera, after carrying it across the country in a specially constructed box. In San Francisco, we rented a wide lens camera which we turned over for operation to L. Dermott Stiles, a young chap living on a ranch within three miles of the eclipse path whose love was adventure and whose hobby was photography, and he so masterfully managed the camera that we had two photographs instead of one of the eclipse.

Bad flying conditions on Saturday kept the aviators from getting in contact with us on that day but early Sunday morning when we drove from the Stiles ranch with auto, trailer and telescopic camera and mountings to the site selected the day before we saw with delight that a pursuit plane of the Navy awaited our arrival. Lieutenant Leslie E. Gehres, U. S. N., was in command of the expedition cooperating with us. Tentative plans for the observations of the eclipse were soon made and Lieutenant Gehres then returned to Reno, where the planes were basing, for the Sikorsky amphibian transport plane, piloted by Lieutenant Warren W. Harvey, and the remaining members of the party, including Chief Photographer Haase and Photographer W. A. McDonald, who were to operate the motion picture cameras.

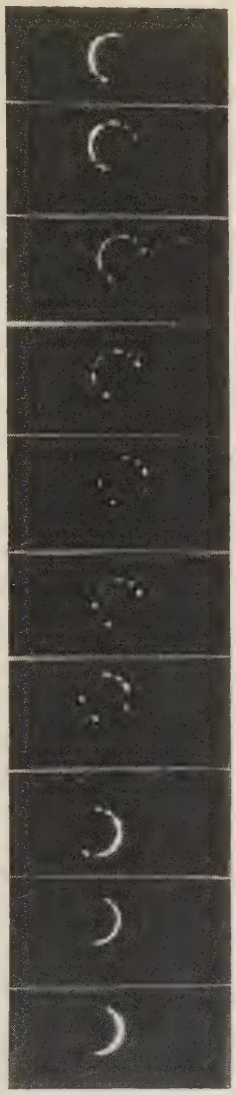
Sunday was a busy and exciting day. We had a trial flight in the Sikorsky along the moon's predicted path. We unpacked and adjusted our telescopic camera, rehearsed our plans of observation, and ended up with a picnic lunch in the cabin of the Sikorsky late in the afternoon. And what a gay group of picnickers we proved to be.

Less than a thousand feet away was the Mt. Wilson Observatory party, which had been on the ground for over two weeks and had selected, as we had, the intersection of the boundary of the Plumas National Forest with the highway as a point on the predicted path. Compared to their finely equipped camp we felt that our little affair hardly deserved the name of camp at all, especially as we packed up our instruments and carried them back to the ranch at night and the aviators flew back to Reno for the night.

That evening we loaded our plate holders in a dark room of the Stiles Ranch. There were five in our party, an old college friend, Olive Brown, with whom we had stayed in San Francisco, and who had motored up with her sister and nephew, to join my son Raymond and myself. Late into the darkness we sat before a cheery fire on the hearth of the ranch-house listening as our young friend Stiles and his father told tales of the country and pioneer days.

It had been a cloudy threatening day and the weather prospects were discouraging but we refused to be discouraged. Before retiring we had all gone out to look at the sky and the stars were shining brilliantly. We were elated at the prospects of clearing weather.

About four in the morning I was awakened by the gentle patter of rain upon the roof. There are times when this is one of the most soothing sounds in Nature but now it made my heart sink. At six o'clock it was raining in a steady downpour. No change at seven and but little at eight. At eight-thirty we were due to meet the aviators. The sun was calculated to be totally eclipsed at 5 min. 52 sec. after 11 o'clock. First contact was due at 9:40. At nine o'clock we stopped at the Mt. Wilson camp to set our watch by the radio time signal. Dr. Edison Pettit kindly rated it for us. Last minute preparations were being made. One must carry on as if the sun were shining brilliantly in a clear sky. We hurried on to our own chosen station. It was brightening overhead. The sun was striving its best to break through the clouds. The aviators were coming through the pass in the mountains from Reno. Crowds were swarming down upon us, since they could not get in the roped-off Mt. Wilson camp. Later we had to beg them to stand off at least twenty feet. Twenty minutes before totality a line more than a hundred feet long had formed to look at the image of the rapidly narrowing crescent of the sun on the ground glass of the motion picture camera but they willingly broke away when requested to do so a few minutes before totality.



FROM THE ECLIPSE FILM
Showing transition from solar crescent to Baily's Beads

With this motion picture camera which was set up about twenty feet from our own telescopic camera a most excellent motion picture film of the eclipse was made by Photographer W. A. McDonald, U. S. N., which shows Baily's Beads going all around the disk, the five lunar valleys letting the sun's light through during totality and all the interesting changes in the crescent during the three and a half minutes that the film was run. It furnished perfect proof that we were in the path of total eclipse and that the predicted path was correct and the predicted time accurate within one or two seconds. The photograph which we obtained with the telescopic lens also proved this, though we made our exposure about a second too late and therefore got a thin solar crescent reappearing on the western edge in addition to five Baily's Beads. We had delayed our exposure hoping that the Beads would disappear and the corona would be seen but no corona appeared, either because of the thin haze that covered the sun during totality or because of the brilliancy of the light shining through the five lunar valleys. We did get, however, one of the most remarkable of eclipse photographs, as did also the Mt. Wilson and Lick observers, and feel that we were well repaid for our efforts because of the scientific value of the results.

READY FOR THE CLIMB
Lt. Gehres and Photographer Haase ready to chase the moon

While we were working on the ground Lieutenant Gehres and Chief Photographer Haase had ascended to 18,000 feet and had obtained a remarkable photograph of the oncoming shadow on the clouds at 12,000 feet elevation. The shadow swept over the clouds one mile southeast of the path on the ground, and parallel to it. This shift to the southeast in the position of the path on the clouds was to be expected for the shadow was slanting from the sun toward the earth and its position would change with elevation. Our camp was at an altitude of 4,000 feet above sea-level and we had found it necessary to apply an altitude

correction to the position of the eclipse's path at sea-level.

Lieutenant Gehres has written in the report of the expedition the following description of the advance of the shadow on the clouds: "Just at the indicated time of totality the pilot observed a distinct shadow, purplish to black in color, darker than the surrounding dusk, which seemed to pass almost instantaneously across the clouds parallel to, but a mile south of, the predicted path of totality. This shadow was fairly distinct, seemed about one-half to three-quarters of a mile wide and elliptical in shape. The tops of the clouds upon which it was observed were about 6,000 feet below the plane and about 12,000 feet above sea-level. Haase, the photographer, did not observe the shadow as his goggles had become frosted necessitating their removal and, his eyes being affected by the freezing temperature and wind blast, could only see enough to keep his camera trained upon the line previously laid out."

It is remarkable that such an excellent film of shadow on the clouds was obtained under these trying conditions. Both the shadow film and that obtained on the ground furnish excellent proof that we were in the shadow of the moon. The observed time of totality on the ground was correct within one or two seconds. Although as a scenic feature the eclipse was disappointing, since there was no corona visible, the unique feature of Baily's Beads all 'round the disk was a novelty in eclipse photographs, while the check on the data used in correcting the positions of sun and moon is of considerable scientific value.

A few hours later and we had bidden farewell to old friends and new and were speeding through Nevada, homeward bound, thrilled with our adventure.

We will be able to refer only briefly to the positions of the planets this month. Mercury will reach its greatest elongation east on the 26th and will then set due west about one hour after the sun. Venus is still increasing in brightness and is a fine evening star. It sets about an hour and a half after the sun on the fifteenth of the month. Mars is still in the constellation of Taurus and rises shortly after midnight. Jupiter is now conspicuous in Gemini and rises about three and a half hours before the sun on the fifteenth. Saturn is now in Sagittarius visible in the southeast at sunset, and to be seen until near dawn.

This is the month when the annual meteoric swarm of the Perseids appears. Watch for meteors in greatest numbers about midnight from the direction of the constellation Perseus in the northeast. They will be seen in greatest numbers during the middle of the month.

THE FRIENDLY ROBIN

HE POSED MOST BEAUTIFULLY

BY H. E. SCOLES

PHOTOGRAPHS BY MRS. H. E. SCOLES

ONE morning there was a clatter amid the baby's toys on the porch, and the whole family investigated. There he was, perched on the handle of the tea-kettle, and making himself as much at home as if he were Christopher Robin instead of just an immature robin of the wild. Down among the dolls and carts and fire-engines he played, unconscious of the thrill he gave us and of the way human babies would use the toys surrounding him. Now and then he would hop once more to the tea-kettle handle, there to open his beak wide as if wondering why someone did not present him with a worm. Mrs. Scoles went for her 3 A Graflex, and approached within three feet of him for a close-up before he warned by his trembling wings that he would fly if she came nearer.

NOT A BIT AFRAID

Below he wonders if anybody around has got an extra worm

Even the dolls seemed to note his brilliant presence, as the lower photograph proves. As for the black baby—it was too much for her, and she turned her back. After complete investigation of the surroundings, the young robin took his leave with a cheery chirp that seemed to say, "Au revoir. You may expect me back again in another happy spring."

ONE FOOT HIGH, FIFTY YEARS OLD

It lived a lifetime of starvation on the barren rocks of Lake Superior shore, yet is normal in all but size

DWARFED PLANTS

THEY ARE NORMAL IN ALL BUT SIZE

BY ALBERT A. HANSEN

PLANT dwarfs are usually associated with a lack of food. Let us consider, for example, the ubiquitous weed known as Canada fleabane or horseweed, *Erigeron canadensis.* In rich soil this species may grow to a height of eight or even ten feet, but I have also found midget seed-bearing specimens scarcely three inches high growing in the sterile soil near railroad tracks. A similar phenomenon is familiar in cornfields where the plants at the ends of the rows, forced to compete with the weeds for food, are frequently severely stunted. Dwarfing in plants, called nanism by botanists, is not always due to a lack of food, however, since it may occasionally be hereditary as in the case of the dwarf evening primrose, *Oenothera nanella,* a dwarf mutant that comes true to seed.

A flora of dwarfs was discovered by the writer along the southern shore of Lake Superior near Norland, Michigan, on the interesting Keweenaw Peninsula. On the bleak rocks that line the coast, a lilliputian forest of stunted arbor-vitae and pigmy black spruce was found. In the scanty soil of a rock crevice grew a tiny arbor-vitae six inches in height, a mere seedling in size but a mature tree in age since it bore perfect cones. Then there was another specimen scarcely a foot tall although of perfect proportions. This tiny tree was pried from its rocky support, carried to the laboratory and thin sections of the stocky little trunk were made with a razor blade. The microscope revealed the startling fact that this undernourished, undersized plant was a mature tree over fifty years of age, as indicatetd by the annual rings. A foot-high spruce was also examined under the microscope and eighteen distinct annual rings were counted. The undergrowth of this pigmy forest contained specimens of shrubby cinquefoil, ordinarily a fair-sized, robust shrub, scarcely three inches high. Here among the barren rocks grew tiny asters and diminutive goldenrods so small as to be almost unrecognizable.

The explanation of the cause of this remarkable flora is simple enough. The rocky shore afforded little moisture and less food, so the plants simply couldn't develop properly under the adverse conditions. In the rich soil a few yards back of the shore one could find magnificent specimens of arbor-vitae and spruce over fifty feet in height while full-sized asters and goldenrods grew in glorious profusion. The miniature plants on the rocky ledges were struggling against the same harsh conditions that have been responsible for the dwarfed ponies that have evolved on the cold and barren Shetland Islands. Shetland ponies were not bred to become dwarfs as in the case of types of lap dogs, (Continued on page 130)

A MATURE ARBOR-VITAE

Though only six inches high, this plant has normal cones, and these bear an abundance of perfect seed

JUST BEGINNING TO FIGHT
The start of the invasion. (Inset) The four-pronged seed aids its spread

A WEED ATTACKS

THE WATER CHESTNUT THREATENS FISHING WATERS

BY EARL V. SHANNON

The water chestnut has not been content to invade merely the Potomac. Its hardy qualities have made it difficult to fight everywhere. Only by complete destruction may plants be prevented from propagating

ON THE Maryland shore of the Potomac at the extreme southernmost tip of the District of Columbia is a little bay known from the maps as Oxon Creek. Into it debouches a sparkling brook meriting no further designation by the nearby residents than just "the branch". Cut off from the river channel sufficiently to possess a quiet seclusion this locality once contained just the proper assortment of deep water, eel grass shallows, islands of pickerel weed, tidal marsh and willow-shaded estuary to constitute a paradise for the fisherman and Nature lover.

For uncounted years an ancient and decrepit character known as "Captain Bird" squatted in a tiny shack on the shore, and furnished for a tithe, from a tremulously stilted pier, a craft as venerable and unseaworthy as himself. Here the initiated could repair with hook and line on a drowsy summer's day to loaf many hours in contemplative enjoyment. For the more sophisticated there could be live bait and casting for the abundant large mouth bass; the boys and the more placidly inclined threw out the worm for innumerable yellow or white perch, varicolored sunfish or crappie. And if the Potomac happened to be in turbid mood and the wind upriver with a rising tide, much sport resulted from filling a jute bag with eels.

One year there appeared unnoticed a little plant of unfamiliar kind before Captain Bird's landing. It consisted of an attractive rosette of green radially-arranged leaves on the petioles of which were spongy air bladders to keep the rosette afloat and on an even keel. The rosette reminds one of the water hyacinth although it is more compact and flatter and it is anchored to the bottom by a long pliable stem along which are arranged ciliate aquatic leaves. But there were no beautiful purple flowers, which is the one redeeming feature of the water hyacinth.

The second year saw numerous scattered groups of three to eight rosettes each in Oxon Creek. They made a rather attractive addition to the flora. The third year saw a dense patch an acre in extent; the fourth, ten acres; and the fifth year, a hundred acres. No longer were there little groups of plants like floating lily pads on which a frog might maintain insecure footing or 'neath which a perch or bass might lurk. Instead was a dense sargasso of crowded vegetation, decaying and diseased through its own competition for space.

And every summer since such a condition has existed in the whole of the little bay, except the southernmost part where there is deeper water—a historic little patch

THE FRUIT AND FLOWERS OF THE WEED
They are concealed beneath the leaves, and have little beauty

in which anchored the British frigates with their carousing soldiers during the levy on Alexandria following the sack of Washington in the war of 1812. It is impossible to propel a boat through the crowded growth. The native aquatic plants are annihilated, game fish are driven from their breeding grounds and the whole of the water is given over to this plant. Captain Bird is dead, his wharf gone, and acres and acres of morass stretch where once the fishermen's boats used to drift on sunlit afternoons. All in a few years and all due, in a way, to a single introduced plant. Oxon Creek is ruined.

Now little initial colonies like the inoculations of a disease are appearing in Swan Creek, Gunston Cove and the lotus filled bays of the beautiful Potomac all the way to salt water. Where fresh water fish and flowers can grow this plant will thrive even to our northernmost borders. It is hardy and does not find itself vanquished by the Frost King as does the water hyacinth. One seed can produce ten billion offspring in ten years, capable of covering over two hundred square miles of water. A seed dropped in a favorite pickerel or bass pond and left untended for a few years would leave neither fish nor pond. The Potomac seems practically doomed to be taken over as the plant can grow in as much as eight feet of water and there are few stretches over this depth outside the steamer channel. When mature, the plants break loose and drift in masses finding new worlds to conquer. Here is a weed in the worst sense of the word, the worst aquatic weed within our borders, once it has a chance to become established.

A PERSISTENT PEST
These seeds were found in fossil rock one million years old

This plant which came to the waters of Oxon Creek was the water chestnut, *Trapa natans*. Its flowers are concealed beneath the leaves, and are small and inconspicuous. They have only a few white petals which easily fall off and leave only the green fruit, which grows to the size of a hickory nut, then drops off and falls to the bottom of the creek. When ripe it is green with four sharp prongs so arranged that one is always upward, giving the plant the additional name of water caltrops, after an old time four-pronged instrument of war designed to injure horses' feet and thus impede the movements of hostile cavalry. The four prongs of the *Trapa* seed are sharply pointed and when a freshly-ripened seed is washed ashore and dries out each point becomes sharply barbed like a hedgehog quill and penetrates and clings to any living thing that encounters it. It may thus be carried from pond to pond or from river to river by animals or birds before being dropped again. In this way does the plant spread. The fruit consists of a thin tough

TIME BRINGS A VERITABLE SARGASSO SEA
From a few drifting plants grows a close-pressed mass that drives out fish, fishermen and water plants

skin covering a single large seed. When fresh this is crisp and starchy with a sweetish taste somewhat intermediate between the flavor of a chestnut and that of a raw potato.

Whence came this unwelcome and odious plant? It is native through southern Europe and Asia and northern Africa. No species is native to the North American continent. In southern Europe the seeds are roasted and sold on the street like chestnuts. A species differing only in the form of the fruits is the water nut of China, often sold in curio stores because its curious form resembles a bull's head and horns. This also is used as a food.

The water chestnut is offered for sale by many horticultural dealers in this country and is highly recommended as an ornamental plant for aquaria and aquatic gardens. It is to be hoped that purchasers will not allow it to spread. When one pond is infested it will be only a matter of time until a wandering mink or muskrat will carry a seed entangled in his fur by the sharp barbs over to the next lake or pond and then the only way to eliminate it is for some interested person to pull up and burn or destroy every plant. Like most weeds, it seems free from natural enemies—a sad reflection in view of our vanishing chestnut. And as it is doubtful whether the American public can be persuaded to cultivate a taste for the fruits, there is no economic excuse for its spread.

Although no representative of the genus it represents is now native on this continent, seeds very similar to those now growing in the Potomac are found as fossils embedded in rock millions of years old in the Nevada desert, proving that it lived here in past ages but was, by some fortunate circumstance, annihilated. But it seems to have made its rediscovery of America, and is liable to carve out too large a place for itself unless in time, its rapid growth is prevented.

TAME FLOWER LEAVES HOME

FOR OPEN SPACES

BY WILLIS G. WALDO

A GARDEN RUNAWAY

The Star of Bethlehem refuses to stay in the flower plot and threatens to become a hobo weed

Because of its detrimental effect upon the flavor of cow's milk, farmers and dairymen in many localities in the East are complaining of the prevalence in their pastures of the Star of Bethlehem, or Ten O'Clock, *Ornithogalum umbellatum*, a cultivated plant, which like the little prairie bloom of the well-known song, is "growing wilder every hour."

This runaway flower is a pure-white member of the much cultivated lily family which was brought to this country from Italy many years ago for planting in our gardens.

At least fifty years ago it had escaped and was already planting itself in many places in the east, and since then it has had opportunity to become established in damp fields, along shady roadsides and in moist waste places from Maine to Virginia, and there in May and June it is to be found, sometimes in such abundance as to become a notorious pest, especially in a wet spring.

The flower itself is well worthy of a place in the garden. It forms attractive groups like the one illustrated and provides pleasing effects when planted as a solid bed or used as a border. The flower is borne in a terminal cluster, four to eight in a group, upon the end of a long stout stem or scape. Each blossom is carried upon a slender little stem or pedicel, with a small leaflet or bract, at the junction of the pedicel with the scape. Each is most delicately beautiful.

Ten O'Clock has been named from the fact that the sepals of the flower form a six-pointed star that opens after the morning sun has risen. The blossom closes at sunset or during dark cloudy weather, disclosing stripes of green on the outer sides of the petals. The plant is not easily eradicated, for it grows from a deeply-buried bulb.

Helps and Hints

FOR HOME AND GARDEN

LANTING THE GARDEN, MONTH BY MONTH

By Romaine B. Ware

When the yellow lily flowers in the meadows, and the red, in dry land and by wood paths, then, methinks, the flowering season has reached its height.
—THOREAU.

August, the last of the summer months, ds in our gardens a lingering charm, and owsing among our treasures we some- w sense a feeling of departing beauty. In ny respects the climax of the garden year s been reached and while there is still wealth of brilliant color to be enjoyed, e can not help but realize that the season on the downward grade with impending sts not so many weeks ahead. This makes think of the fall planting season, now se at hand. In fact there is much that y be done this month, some of it actual anting and in addition preparing for the aterial to be planted later.

August is the approved time to plant nsy seed for plants that will bloom early xt spring. Like most other seeds planted ring the summer months they will be more tely to succeed if started in a cold frame here moisture and exposure may the more sily be controlled. Be careful in purchasing ed to get the finest pedigreed strains, nsies being one of the flowers where ality seed is important. The finest strains e the results of years of careful selection d today seed may be purchased to produce tain specified colors and types. Pansies e by nature biennials and while it is pos- le to carry them over an extra year or o the quality of the bloom will not be as od and they are best replaced each year th new plants.

Oriental poppies may be propagated at s season by digging up established plants d cutting off the roots below the crown d again cutting each root into pieces two hes long. Each piece of root may be nted in well prepared soil, two inches ep, right where you want the plant to om. Within a month the young plants ll make their appearance above ground d most of them will bloom well next ing. Late July and early August is the ly safe time to do this and it is an ideal y to propagate them and be sure you are ting identically the same thing as the ent plant. Expensive choice varieties are easily and freely propagated this way the more common varieties. Oriental ppies are seldom if ever satisfactorily wn from seed.

Most authorities are of the opinion that ergreens may be as safely moved at this e as during the spring. They must always handled with a ball of soil so that their ts are not exposed to the air even for ew minutes. Evergreens are very different m deciduous plants, their sap is of resin-

(Continued on page 127)

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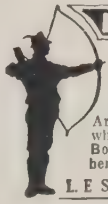

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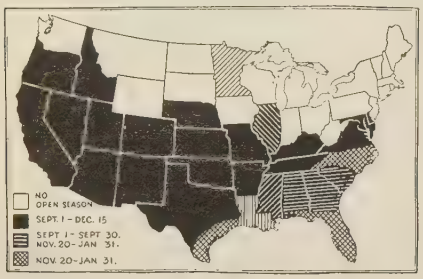
THINGS TO THINK ABOUT

A PAGE DEVOTED TO CONSERVATION FROM VARYING ANGLES

Open Seasons on Mourning Doves

The 1929-1930 seasons for shooting mourning doves show some improvement over those of the past year. States not tinted or marked have no open season. In the black



colored states, however, the season still opens on September 1, when many of the birds still have eggs or young in the nests. In all those states in black, but not otherwise marked, the season continues until December 15—105 days—and with few exceptions the gunner may kill 25 doves each day.

Illinois has an open season of 30 days. Minnesota allows doves to be shot for only 16 days beginning September 16. North Carolina and Florida have reduced the season to the period between November 20 and January 31; eastern Texas from November 1 to December 31. Mississippi, Alabama, Georgia and South Carolina have the so-called split open season, there being a period in the middle of the fall when no doves may be shot. Louisiana has abandoned the split season, and authorizes killing only from December 1 to January 31. There are some county exceptions, and some of the seasons may be changed this fall.

When the gentle and beneficial dove is given proper consideration no state will allow its killing, especially when it is caring for its young.

Saving Empire's Game

The sun never sets on the British flag, but the sun is setting for many varieties of wild life that once flourished within the bounds of the Empire. To save the remnant, and bring back, if possible, those species threatened with destruction, The Society for the Preservation of the Fauna of the Empire was founded several years ago, and immediately began to accomplish important conservation results. Recently, the citizens of the United States contributed more than $8000, $1000 of which was the gift of the American Nature Association, toward the furthering of the work. Some of the achievements of the Society have been to influence the establishment of game preserves in Uganda, Kenya, the Sudan and Nyasaland, to promote game laws in Africa, to establish game wardens, influence native governments to protect rare species and stop the slaughter of game, and to institute educational campaigns, the effect of which is greater than any number of prohibitions. The organization has as its aims the establishment of more game reserves out of the power of land speculators, the arbitration of game matters with colonial and economic developments, and the education of the public by all legitimate means of publicity.

California's State Bird

The California quail (including surely the valley quail, a wider ranging race) has been selected as the State Bird. The claim is made that this is the first instance of a state's selecting a bird exclusively inhabiting its territory and we believe it is the first time that a bird classed as game has been chosen. We hope that the Golden State will treat well the bird of its choice; and that, by the same token, other states may be led to choose birds that need to be cherished. There are a number of states that have not chosen a bird, and there are a number of much persecuted birds that need the friendly interest that should go with such a widespread expression of affection. What state will come forward and claim the sage grouse, the bobwhite, the ruffed grouse, the prairie chicken or the woodcock, to name a few? Will not some southern state with no bird select the mourning dove? Let the good work go on!

NATURE—WHAT A BORE!

Interesting comment on the progress of esthetics in the United States according to the Outdoor Advertising Association:

"The poster makers who make interesting pictures, who suggest the arts and facts that lift us out of the commonplace in our machine-driven lives, these artists are angels in disguise. They have found the secret of the fine arts, that spirit of inspiration glorifying the commonplace.

"Certainly, few journeys through the United States offer so much diversity or grandeur that the traveler's eye does not rest with relief upon some work of art AFTER THE UNUTTERABLE BOREDOM OFFERED BY NATURE."

The capitals are ours.

More Protection Needed

Bag limits have been reduced (on one class of game birds), and some conservationists have come to see that other birds need help in other ways. Even those primarily responsible for the serious condition of our stocks of game birds, both migratory and resident, our fur-bearing animals, and our larger herbivores admit their alarming depletion. The days when we could be lulled into quiescent inactivity by stories of increasing stocks, based on some abnormal local condition, are about over. And with a truer realization of the situation far-sighted conservationists are urging the necessity of striving for shorter seasons of killing. Although such proposals are sure to be opposed by those who derive pleasure or profit from destroying, we hasten to put ourselves on record as favoring any proposal that promises to stay in some measure the rapid depletion of our wild life.

Massachusetts Bird Refuges

The Bay state, by virtue of the acquisition by purchase and gift of two more coastal islands, has increased her sanctuaries on and near the coast to nearly a dozen, through the good offices of the Federation of the Bird Clubs of New England. Billingsgate Island near the heel of Cape Cod was formerly a famous hunting ground, but its virtual abandonment allowed it to become a breeding ground for the common tern. The colony was raided last summer by vandals, but now will be protected by a warden. Ram Island, off Newburyport, has been given to the state under an assurance of perpetual care.

Massachusetts has long been in the front rank of states encouraging the study and protection of birds, and this latest evidence of her interest is very gratifying.

"Ingagi" Recalled

Simultaneously with the appearance of the July issue of Nature Magazine came the announcement from Hollywood that the Motion Picture Producers and Distributors Association had decided to recall the film "Ingagi". (We understand, however, that the producers of the film are still doing a thriving business through the medium of independent theaters not reached by any edict of the organized elements of the industry). Between the time of our going to press for July and the date of appearance of the magazine, therefore, the pot of protest against this film boiled over. According to the United Press story from the movie capital the producer of the film admitted that about eighty-five per cent of it is pure fake. He affirmed that his company took only what they regarded as "the ordinary license allowed any motion picture company in turning out an entertaining picture." The Radio-Keith-Orpheum chain, in announcing cancellation of contracts for the movie's showing, observed that the public was taking the film "too seriously." The film was, indeed, entertaining, but the unfortunate part was that it was presented in such a way, and with such a type of "canned" lecture accompanying it, that it was impossible not to take the thing as something purporting to be both authentic and serious. We see no harm whatsoever in the picture if the public is informed at the start that they are just being kidded. If the producers had left out the fifteen per cent of authentic film, then the result would have been pure hoax. A clever hoax is a lot of fun. "Ingagi" was not—to use the past tense—clever.

English Protect Flowers

An English Society for the Protection of Wild Flowers and Plants has recently come into existence, with ideals and purposes similar to those of the Wild Flower Preservation Society of the United States. Cyril Harding, at 31 the Avenue, Kew Gardens, Surrey, is the honorary secretary. If this British cousin is as successful as the American organization, England, renowned for its wild flowers that were immortalized by Wordsworth, will be fortunate indeed.

Destructive insect pests

multiply rapidly at this time unless checked by the use of a good standard insecticide. Protect your flowers, plants, shrubs and evergreens now, by spraying frequently and thoroughly . . . particularly on the underside of the leaves . . . with Wilson's O. K. Plant Spray, the nationally recognized standard insecticide.

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Kill weeds the Wilson way . . . simply dilute *Wilson's Weed Killer* (1 Gallon to 40 gallons of water) . . . sprinkle . . . that's all. The modern way to exterminate all weeds, poison ivy, vines, etc. One good application a year is sufficient. Inexpensive . . . clean . . . odorless. 1 gallon $2.00; 5 gallons $8.00.

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HELPS AND HINTS FOR HOME AND GARDEN

(Continued from page 125)

ous nature and if the roots are exposed to the air even a short time this sap will harden and remain that way permanently, resulting of course in the death of the plant. Be careful to plant them firmly and soak the soil well. Do not allow new planted evergreens to dry out the first year, during which time they are striving to adapt themselves to their new situation.

If you have not divided and reset your iris planting it may still be done. All varieties including the Siberian and Japanese may be safely moved now. The Tall Bearded varieties should all be divided and reset every third year at least, or they are inclined to produce inferior flowers. The Japs and Siberian can remain a year or two longer. All the Tall Bearded varieties are best planted during a dry spell and unless very dry, need no watering when reset. Excessive water or poor drainage, especially before they become fully reestablished may result in disease getting started. Plants divided and reset at once will become well established and most of them will bloom next spring.

Fall is planting time for many varieties of lilies and they should be planned as early as possible. Due to the fact that a large variety of bulbs are now being grown successfully in this country, it will be possible to plant much earlier than when nearly all bulbs had to come from abroad. Out in the Pacific Northwest and in some other sections, hundreds of thousands of high quality bulbs are being produced. The Madonna lily, *Lilium candidum,* is best planted during July and August, the sooner the better. Plant it when the soil is dry and do not water artificially at all. Place it not more than four inches deep, somewhat on its side and unless your soil is light surround it with a one inch layer of sharp sand, not seashore sand. Use no fertilizer with them.

The soil preparation for planting lilies is very important. They must have perfect drainage and the soil should be prepared to a depth of two to three feet or more, depending upon the variety. The deeper the bulb is to be planted the deeper preparation should go. The Auratum and Regal lilies which should be placed ten to twelve inches deep need soil preparation two feet in diameter and three or four feet deep. This may seem like a lot of trouble but lilies are worth all the care you can give them. Few members of the floral kingdom are as worthy of extra attention. The soil in which they are to be planted should be light and friable with a large proportion of leaf mold and gritty sand. As for location partial shade suits many of them or at least the ground should be shaded to keep it cool and moist and to shield young growth from late frosts and harsh winds. Lilies growing naturally are almost invariably found coming up among an undergrowth of low growing plants.

Of all the plants that require fall planting, the peony is probably the most important. Next month I'll tell you about planting

(Continued on page 131)

Scott's Creeping Bent for Perfect Lawns!

Sod in six weeks! A rich, velvety stretch of lawn that chokes out weeds before they can grow! With proper care no reseeding is ever necessary. You will have a deep, thick, uniform turf that's everlasting and makes your home a beauty spot. That's what you'll get if you plant Scott's Creeping Bent.

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Mayflower Eulogy

Because Miss Maxim's plea for the mayflower as national flower expresses the sentiment of many steeped in New England tradition, we are glad to print it, although the national flower campaign is concluded, and although it is not customary for Nature Magazine to print letters from readers. How far New Englanders have departed from the tradition of their forefathers may be seen from the fact that barely 2000 votes were cast for the Pilgrim's flower in all the six New England states.

EDITORS, NATURE MAGAZINE:

To all New Englanders, and other descendants of the Pilgrim Fathers throughout the country, the possibility of any flower other than our cherished Mayflower becoming our National Flower, is a distinct shock to our sensibilities and patriotism.

In view of the sublime and vital history of that immortal emblem, it is incredible that any other should even be mentioned.

The sacred tradition, handed down through each succeeding generation of Mayflower ancestors, and borne out by our revered New England poet, John G. Whittier, is that it was the first blossom discovered by our Pilgrim Fathers after their tragic winter of indescribable toil and suffering, and was named by them for their gallant ship.

That noble poem "The Mayflowers", by our noble Quaker poet, tells in exquisite verse the tender, thrilling romance of that unrivalled flower, and authentic history gives further proof of the truth of that assertion. One historian says, "Stern and austere as were our Pilgrim Fathers they loved it dearly," and another authority thus comments:—"The fact that our lovely and widespread Mayflower was indeed the first flower noted and christened by our Pilgrim Fathers should settle for all time the problem of our National Flower."

Truly our revered forefathers would turn in their graves should their descendants so far forget their patriotism as to allow an usurper to supplant their own child-flower, as the sacred emblem of the glorious Republic they founded with their heart's blood and soul's anguish!

That immortal Compact signed in the cabin of the Mayflower is the most important document ever compiled in this or any other country, for it laid the foundation of individual freedom, religious liberty, and the principles of Democracy on which Massachusetts, New England, and the great Republic were to build their institutions.

The first Town Meeting and the first elective officers chosen by the majority, blossomed into this glorious Nation and became the first great power in the world.

The entire nation benefited by the great achievements of that little band of courageous, consecrated men, who risked their lives and endured unspeakable tortures for the principles of right and justice.

To them a mighty nation owes its debt—indeed, the whole civilized world is their debtor—and we might add, the Pagan world as well, for our Christian missionaries have penetrated to the farthest corners of the earth.

No famous warship in ancient or modern times, with splendid victories to its credit, can in any sense be compared to the achievement of that noble craft, and the sacred name of the Mayflower should be forever emblazoned on the escutcheon of a grateful nation. And in what better way than naming the emblem of that immortal ship as our National Flower?

Without doubt the entire country would be proud to pay homage to this unrivalled New England product that has figured so largely in the tragic, dramatic, romantic, patriotic, and sentimental history of our country. It would be a tragedy should any other flower be allowed to take precedence over the one so deeply interwoven with our traditions as to actually have played a part in the illustrious history of our loved country—and when its merits are recognized by our highest tribunal that action will redound forever to the glory and the prestige of our land!

Were we to teach our children the lesson of sublime patriotism, we have but to lead them to Plymouth Rock.

Martha Maxim
Cambridge, Mass.

NATURE NEWS and VIEWS

Bear Grass This Year

Bear grass, a universal favorite with tourists visiting Glacier National Park, will bloom again in great abundance in 1930, according to Superintendent J. Ross Eakin.

Without a doubt, this is the finest and most striking flower of the park, as it receives more attention than any other. Whole mountain-sides become great masses of white from the stately plumes, a sight never to be forgotten when once seen. The plants bloom profusely only in seasons following a wet spring; some remain throughout the whole tourist season. Blooming plants being a rarity in 1929, it is especially pleasing to see the many flowers this year.

The long, thin leaves are tough and leathery, being used by Blackfeet and other Indian squaws to make baskets, hence, giving the plant the name basket grass and squaw grass. The name "bear grass" is wholly false, for the plant is a lily, not a grass, and bears apparently have nothing to do with them. By popular choice, it was selected as the park flower of Glacier in 1929.

Borneo Movies

The long-standing circus asset, "the wild man of Borneo," will soon be filmed with sound effects together with his animal and bird companions in his native habitat, as a result of an expedition sent out by the University of Southern California and the Universal Pictures Corporation to the interior of Borneo. Dr. Bruce Magill Harrison is scientific manager of the expedition and Harry Garson managing director. The natural movements and sounds of the strange natives, apes, fishes, birds, plant and other phases of wild life will be recorded, and specimens will be collected. Sponsored and directed as it is, it is not likely that the result will be another "Ingagi."

Town Sanctuary

White Plains will preserve its four hundred acre watershed, now used by the city to preserve its municipal water supply, as a Nature sanctuary, if the Common Council accedes to the plans of six leading civic organizations. Native specimens of plants, birds and other wild life will be given the opportunity to increase, and plants now locally extinct will be restored to the preserve. The area is to serve as an outdoor laboratory for scientists and nature students. The organizations sponsoring the plan have petitioned the Common Council, which is now considering its decision.

Enough Rope

The bromide, "Give a person enough rope and he will hang himself," evidently does not apply to squirrels, as the experience of Dr. W. A. Purington of Dover-Fox Croft, Maine, proves. He noticed a rope hanging from an unused chimney of his house one day, and pulled 32 feet of it from the flue before the end caught. The next morning, he noticed two gray squirrels busily tearing bits of the rope into fluff for their nest, and later found that the home, placed 17 feet below the top, contained five infants, too small to know much of what went on. The mother became quite tame, and joined the Doctor's family to the extent of frequenting his office, where a bountiful supply of nuts was kept for her. A hurrying truck ended her existence one tragic day, but her six-weeks-old infants do not suffer, as the Doctor brought them from their chimney home down to a large box in the kitchen. There they thrived upon a diet of half cream and half water, taken from a medicine dropper, and now are almost ready to go forth hunting nuts on their own.

Glacier Park Game

Glacier National Park boasts of 110 moose, 1,061 mule deer, 1,656 whitetail deer, 239 bighorn sheep, 439 goats, 486 elk, 105 grizzly bears and 335 black bears, the 1930 census reveals. Among the fur-bearers are 676 marten, 201 mink, 49 lynx, 39 otter and 487 beavers. The Richardson grouse number 350, the ruffed grouse 864, the sharp-tailed grouse 107, the Franklin grouse 379, and ptarmigan, 118. Caribou have been recently reported in the park, thus adding a new mammalian species.

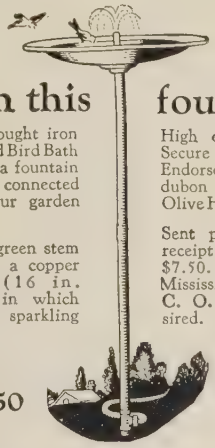
Better Eyes

Binoculars are constantly improving, and with each improvement the enjoyment of Nature students becomes greater, because the birds and animals they can identify and study only at long range greatly outnumber those who allow salt to be put on their tails. Bausch and Lomb have brought out two new models to add to their excellent equipment. No. FG57H has seven power magnification, and No. FG51OH magnifies to ten powers. Both have 50 millimeter objectives, and give a field of great width, clear to the very edge. Furthermore, they eliminate much light absorption, and are particularly suited for use as marine and night glasses.

Rock Gardens

One of the most exhaustive books on Rock Gardens yet to be published in this country has come from the Macmillan Press under the title, *Rock Garden and Alpine Plants.* It is written by Henry Correvon, the French horticulturist who is known to the world as "the greatest living Alpine flower grower," and edited especially for American conditions by Leonard Barron. Mr. Correvon has been a pioneer in rock gardening, and long a popularizer of alpine plants, and his extensive study in this book of all phases of these types of horticulture cannot be ignored. The work is priced at $6.

Attract Song Birds



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Weight 10 lbs.
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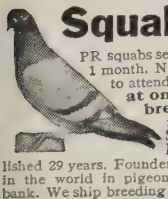

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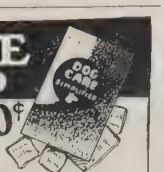

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Bullets and Pets

"The bullet that killed my dog struck his master, also." This is the plaint of Clarence Hawkes, Hadley, Massachusetts author, whose "Foxy" is no more because someone, either carelessly or wantonly, discharged his gun. No longer does "Foxy" concentrate all his fox-terrier vim on old shoes, to amuse his master and mistress; no longer does he ask for pieces of raw potato when his mistress is paring them for the noon meal; no longer is there a little beggar asking for pie crust at the dinner table. "It is incredible that the love of one small dog could have filled the great house from garret to cellar," Mr. Hawkes writes. But it is so, and Mr. Hawkes is not alone in his feeling of loss. Surely it is not maudlin sentiment to mourn the passing of a joyous pet. The void is real, intense, when a companion passes, and the anger that rises against the culprit is no less because he cannot be found or because he is legally free from liability. Mr. Hawkes can be sure that pet lovers everywhere are sympathizing with him.

Battling Bluebird

The story of how one bluebird by his ferocity and dash kept a number of tree swallows away from four nesting boxes for three years, then finally was vanquished, after which the victors fell out among themselves, is told by Miss Elva Dorr of Norway, Maine. For three summers, the bluebird came with his mate, and while she built in one of the nesting boxes, he alternately sang to her, and drove away tree swallows seeking a home in the empty nests. He used to fly from one box to the other, perching just under the entrance, barring it to all prospective tenants, and at times deliberately pushing a swallow off the house when one dared to look in. As many as eight swallows would accompany a ninth to the box, but before they could act, the bluebird would be in the box, and the enemy would not dare to storm the fort. This year, however, a swallow caught the bluebird off guard, knocked him off a telephone wire, caught him on the ground, and pecked him with a vigor worthy of greater deeds. Suddenly he stopped the assault, then, as if he remembered the insults of three years, pounced on him again, and when it was all over, the bluebird, much wiser and pained, went directly to his own house to stay. The swallow then established his longed-for home; another swallow came, and set up housekeeping in an adjacent nesting box, with nary a protest from the beaten bluebird. But the victors could not dwell in amity. One day Miss Dorr saw a male severely peck his mate, driving her in the nest, then proceed to attack the other male swallow in a Battle of the Century the press never got wind of. The two combatants now wheeled round and round, now darted at each other ferociously, now stopped to give vent to cacophonic sounds that attracted passersby. Finally, without rhyme or reason, they made a dash for the plate glass window of the nearby house—and now two swallows lie buried under an apple tree, two females wait in vain for their mates, and the vanquished bluebird has things once more very much his own way.

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DWARFED PLANTS

(Continued from page 121)

but are a natural product due to adverse conditions.

The principle of dwarfing plants by a starvation process has been utilized in China and Japan in the production of the famous oriental pigmy trees. The process, termed *Tsukurimono* by the Japanese, is perfectly simple, consisting merely of continual pruning of the root systems of young trees combined with light cutting of the branches to induce more compact foliage and to prevent the loss of too much moisture. By this method a cedar tree three hundred and fifty years old was produced that is barely a foot in height. These tiny "trees of life" are exceedingly popular in China and Japan and they created a sensation when first introduced into Europe and America. Occasionally the wily oriental pigmy gardener gives his young dwarfs an aged appearance by covering them with a sugar solution and allowing ants to attack the sweet coating. They eat into the bark and the juvenile plants take on the weather-beaten appearance of hoary old age.

The seeds produced by aged trees artificially stunted will not produce dwarfs in turn. However, the dwarfing characteristic can be perpetuated artificially by vegetative propagation. The bark of a limb is slit a number of times and soil bound around the injured part. If the soil is kept moist, roots will appear and the cutting can be made by this means that will develop into a dwarf offspring.

Nature affords numerous other examples of the dwarfing of plants due to insufficient food or moisture. Among the most interesting is the mesquite of the southwestern United States, a species famed as an indicator of sources of water. It is said that water will always be found if one follows the roots of the mesquite. Under ordinary conditions, the mesquite is a fair-sized tree, but under unfavorable food and moisture conditions it becomes a twisted, stunted shrub.

There is a lesson to be learned from these dwarfs of Nature. If the farmer or gardener wants strong and healthy plants, he must needs feed them properly with fertilizer and organic matter. The dwarfed inhabitants of the barren Lake Superior shores illustrate well that a starved soil begets starved crops.

New Honors

Alfred E. Smith's love for open spaces and out-of-door recreation is well known, and his appointment as a commissioner of Interstate Park, lying both in New York and New Jersey, occasioned no surprise. He has been largely responsible, as a former governor, for the New York State Park system, and takes particular interest in Interstate Park. His frequent visits have been the delight of the Boy Scouts who annually camp there, and they made him their hero, loading him down with honors and offices. He has been a constant worker for the preservation of untrammelled areas which serve the city-bound populace as places of recreation. As a Commissioner of one of the greatest parks in the nation, his influence even beyond his state will be unbounded.

LITTLE PEOPLE OF THE GREEN THINGS

(Continued from page 112)

the life and development of each kind. But our statements may apply well enough to give an idea of the very peculiar life they lead. Each kind has been studied and observed in all the complicated phases of its life. Aphids have been named, tagged and classified; mauled, dissected and analyzed; preserved, mounted on slides, and written about. So there is yet time to learn a lot more about each individual if you wish. They come in all colors of the rainbow, although green seems to predominate. But for all this they are, in general, structurally similar. They are all small, one-quarter inch being a rarely attained length. At least before taking leave of them you must admit that, in the case of plant-lice or aphids, truth is stranger than fiction.

Mather Appreciation

After weeding out numerous suggestions for a suitable memorial for the late Stephen T. Mather, former Director of the National Park Service, The Stephen T. Mather Appreciation, headed by John Hays Hammond, has finally decided to restrict their activities to three fields. A fund of $25,000 will be raised to place in each of the twenty-three National Parks an appropriate bronze plaque, carrying in relief the bust of Mr. Mather above an epitome of his work. Efforts will be also made to secure an appropriation from the national government for some form of tribute in the Capital City to the memory of the great conservationist. The third phase of the program will include cooperation with active groups to successfully carry through some of the local, state and National Park projects dear to Mr. Mather's heart. Committees will be appointed by the Appreciation to carry out the details of the memorials.

Hold-Up

Car X905055 of the Chicago, Milwaukee, St. Paul and Pacific Railroad was, two months ago, just another freight-car, one of the thousands that thunder over the network of rails throughout the great Northwest—and now it is again but one of a string of eighty or so ponderously groaning its way over the mountain reaches. For three short weeks, however, it was a car among millions—"dead" on a siding in Tacoma, Washington, by the "super's" order, and the object of the attention of a whole city. For in its "airdump" under the sill step, a mother robin had taken her abode and soon three blue eggs gleamed amid the rust and dirt. They were discovered; orders flew up and down the line; finally the super, Charles E. Devlin, told the whole world in general and the yard force in particular that wholesale dismissal awaited the man who moved car X905055 one inch. "Keep the car stationary until the eggs are not only hatched, but until the three young robins can fly," he ordered. So the siding was kept inviolate, traffic was rerouted, the eggs hatched, the young birds tried their wings, and hundreds came to view the nest. And not until the birds had left as unceremoniously as they had come, with never a word of thanks to the railroad, did car X905055 become again one of its kind.

BIRD TALES YOU MAY NOT BELIEVE

(Continued from page 84)

camera, suppressing quick movements as I did so. By the time I reached a suitable spot Doc had given the dove quite a ride on his trick elevator. The bird was by now three feet above the ground. At that moment it dawned suddenly upon me what he was trying to do. On a natural twig at shoulder height perched a dainty vermilion flycatcher. The Doc was set on raising the dove to the flycatcher level (an ambitious feat of nomenclature in itself) and placing her on the perch beside the other, that the two might become better acquainted! I let go the shutter when the birds were but a few inches apart. The Doc's brotherhood scheme failed by the slimmest margin. As the dove was about to be transferred the flycatcher either lost nerve or saw a passing insect and darted away.

Again I stopped to take cactus pictures along the trail and caught up with the doctor to find him again working his mesmerism on a subject, this time a mockingbird. Already Doc had him hip high and was waving the wand slowly about, seemingly to see just how far he could go. I made up my mind he was deciding to drop medicine as an overcrowded profession and take up bird training. But just then he must have boiled over with mirth at the situation, jiggled the stick and startled the victim because the mocker flew into the underbrush.

Reader, if you are a devotee of ornithology and if you are tolerably contented with the way birds act toward you on this North American continent of ours, *don't visit the Galapagos Islands*. If you do, dissatisfaction will be yours thereafter. The chickadee or the nuthatch that takes food from your hand will become just a material-minded little beggar. You will demand of your birds that they come to you freely; that they fraternize with you for companionship alone; that they cease to demand tidbits of food as base bribe. For such is the way of the creatures in that strangest of Never-Never Lands—the Galapagos.

History of Light

The fascinating story of how man learned to light his home and his way, how candle followed the crude lamp, and gas light followed kerosene, forms the subject matter of an interesting primary reader written by Ida Belle Lacey, and published by Macmillan. In simple language, with excellent drawings and photographs Miss Lacey, who is supervising agent of primary grades for the Connecticut State Board of Education, has carried the history of light from the prehistoric days down to the creation of New York's Great White Way. The book is supplemented with an index and topic questions at the end of each chapter.

English Bird Lovers

It is gratifying to note that *The Bird Lovers League Magazine*, published quarterly at Bishop's Hill, Polzeath, Wadebridge, Cornwall, England, has nearly filled its subscription, thus assuring its continuance during 1930. Further funds will be needed for 1931, however. The League now has 22,392 members in Europe and America, and cordially invites all bird lovers to join. During the first three months of 1930, 12 new members came from the United States.

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AND
TOM GILL
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HELPS AND HINTS FOR HOME AND GARDEN

(Continued from page 127)

them and suggest some varieties. Now is the time to prepare the soil and the more carefully it is done the better the peonies will be in the decades to come. If you have reasonably good soil to a depth of two feet the minimum of preparation will consist of digging a hole two feet deep and as large in diameter for each root to be planted, spacing them not closer than three feet each way. Chop up some sod and mix it with the lower foot of soil and if thoroughly rotted manure is to be had use about a peck to each hole. In the top ten inches of soil use no manure at all. Work the soil up nice and fine, fill the holes about two inches above the surrounding level and leave them to settle. August is an ideal time to do this and then the ground will be ready to plant in September. If you wish to do an extra good job, follow the same plan but go three feet deep and as large in diameter. The peony is a quality flower worthy of your best attention and once you enjoy the bloom from some really first class varieties you will realize how important they are to the better class of gardens.

In most every garden some chance perennial seedlings will spring up from time to time and frequently they prove to be worthy of saving. You should always be on the lookout for these little seedlings when you are cultivating around established plants. If you are familiar with the appearance of young seedlings of the various perennials it will be easy to recognize them. When you find these little self sown plants, dig them out with a goodly ball of soil and transplant to a trial plot where they may prove themselves. It is better to handle them this way than to plant them in your borders and if they are inferior to have to remove them. Don't overlook the fact that in the limited area of our home gardens there is not room for a single mediocre specimen. Only choice varieties have a right to occupy space in what should be a most carefully planned border. It is just as important to know what to leave out of a quality garden as it is to select choice things to plant in it.

If you are planting any new pieces of lawn this fall, now is the time to get busy. Fall is by far the best time to start a lawn, the soil can be put in better shape than early in the spring, fall rains will aid in hastening germination and growth while the cool weather of fall encourages root growth. Also, very few weed seeds germinate in the fall as compared to spring and when growth starts next year the new grass will be well established and growing so vigorously that few weeds will be able to compete. August is the ideal time to prepare the soil and get ready to plant the seed which should be in the ground by the end of the month.

Soil preparation for a lawn is comparatively simple, at least three or four inches of the surface soil should be good quality loam and to get the best results should contain a fair supply of humus. This may easily be supplied by working in a layer of leaf mold or peat moss an inch or more thick. Together with the humus, a dressing

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of steamed bone meal, raw bone meal and coarse ground bone will do much to start the grass off well and keep it going. The steamed bone meal acts almost at once, the raw bone meal in a few months and the coarse ground bone gradually gives up its food elements throughout a year or more to come. All this should be thoroughly worked into the soil and the entire surface layer pulverized very fine that the grass roots may make perfect contact.

If August drought threatens your garden, soak it thoroughly every ten days. Never sprinkle as that encourages surface root growth. See that the soil is thoroughly wet a foot or more deep and then cultivate as soon as surface will permit. Mulching is fast coming to be considered more effective than cultivating and may be practiced where neither watering nor cultivating is possible.

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MEMORIAL AND TOWN FOREST PLANTING MOVES FORWARD

HAGERSTOWN, MD., GIVES A FINE EXAMPLE OF WHAT CAN BE DONE; FOREST NAMED IN HONOR OF MATHER

ONE of the greatest forces in our civilization today is the power of the printed word. The printed word does strange things; it even plants trees. The proof of this is in the report of Mrs. James Findlay of the Hagerstown, Md., Civic League who writes:

"I wish to pay my tribute to Mr. Pack and the American Tree Association for our Town Forest owes its existence to the Forestry Primer and the booklet, Town Forests, from which publications I received the inspiration and knowledge which has enabled me to inspire others to have a vision and to see what a Town Forest would mean for our community."

The Hagerstown Civic League inaugurated the movement to establish a Town Forest on a farm owned by the city and bordering on beautiful Antietam Creek. The movement was approved by the city authorities and the League asked for three acres of land on which to plant three thousand trees. The Rotary and Lions Clubs joined in providing the funds for the project and the State Department of Forestry furnished the trees at cost.

What this Maryland city did others can do. In the state of New York the county and school forest idea is making great [illegible] per cent of the total number of trees [illegible]d in county forest projects. The [illegible] was in [illegible]

Stephen T. Mather forest is on the Bolton road on the west side of Lake George near Tongue Mountain, not far from the Gene Stratton Porter forest.

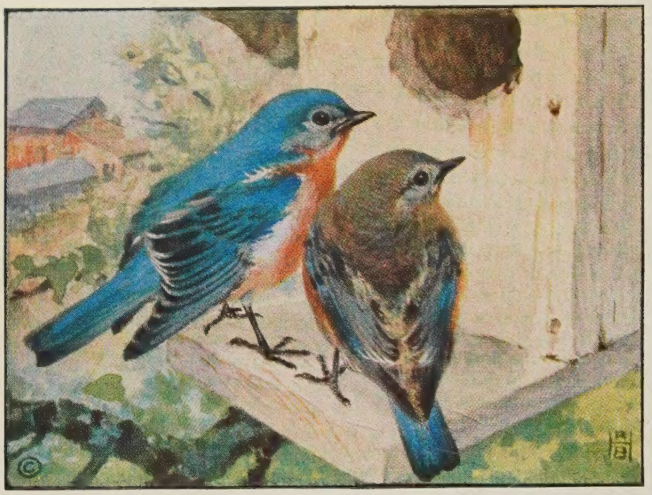
Some fine examples of tree planting are found in Massachusetts where the planting of 1,904 trees was the outstanding feature of the conservation and thrift work of the Massachusetts chapters of the Daughters of the American Revolution according to Mrs. Justus R. Friedline, national chairman of the conservation and thrift committee, in her annual report. Massachusetts is one of the few states that has a D. A. R. forest, says Mrs. Friedline's report.

In New York three hundred and eighty more members of 4H Clubs have filed pledges with the New York Conservation Department to reforest and protect an acre of land on their home farms and will receive from the state 1,000 free trees. The members of the 4H Clubs are farm boys and girls between the ages of 11 and 18 years, and more than 2,000 have pledged themselves to reforestation projects and have planted on their home farms more than 2,000,000 trees. To each member of a 4H Club who undertakes a reforesting project the state gives the first 1,000 trees.

The individual tree planter finds may reasons for his activities. There are various dates to be marked such as births, weddings and other celebrations. A tree planting ceremony was held [illegible]t the School of Journalism of the University of Missouri, when [illegible]eñor José Santos Gollan, Jr., lecturer on Argentine Journalism [illegible]nd Literature at the University planted two trees on the [illegible]rounds near the northwest corner of Jay H. Neff Hall, the [illegible]ome of the School of Journalism. The two trees are indigenous [illegible] Argentina, and were obtained by Horace F. Major, professor [illegible] landscape gardening at the University. Dr. Walter Williams, [illegible]ean of the School of Journalism accepted the trees in the name [illegible] the school.

Freshmen classes this Fall should plant trees marking the [illegible]ening of college life. The living tree makes a remarkable spot [illegible] return to upon the fiftieth reunion of a class. Perhaps there [illegible] opportunity for a memorial walk or a memorial grove.

With the plans now underway for marking the two hundredth [illegible]niversary in 1932 of the birth of George Washington, the [illegible]merican Tree Association looks for the tree planting army to [illegible]eak all records. The Association has taken over the tree planting part of the celebration for the George Washington Bi-Centennial Commission. In this phase of the celebration every individual and every organization can have a part. The American [illegible]ee Association will send anyone tree planting suggestions and [illegible]plication blanks by which the tree planting will be registered [illegible] the national honor roll.



BLUEBIRD—*Sialia sialis*

TREE SWALLOW—*Iridoprocne bicolor*

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